

Retiring Nuclear Plants • Growing Native Fruit

GARBAGE

The Practical Journal for the Environment

MARCH/APRIL 1992 • \$3.95
CANADA \$6.95



The Green Office

Moving Beyond the Ceramic Mug



0 73361 64780 1

Sitting by the curb, a bag of aluminum looks like a bag of steel or a bag of glass or a bag of plastic. But if you have any trouble telling one from another, just wait until they get to the recycling center and you put them up for sale.

**In 1990,
Dakota County, Minnesota
Earned \$528,347
Selling Its Recyclables.
\$396,938 Came From
Aluminum Cans.**

Take the case of Dakota County, near Minneapolis/St. Paul. In 1990, used aluminum beverage cans earned the county over \$1,100 per ton—many times more than any other recyclable. In fact, of the \$528,347 the Dakota County recycling program brought in during 1990, almost \$400,000 came from one single source—aluminum cans.

Nationwide, aluminum earns recyclers

15 times more than steel, eight times more than plastic and 18 times more than glass.*

Why the huge difference in value? The economics of aluminum.

Unlike most other container materials,



100% of every aluminum can is recyclable directly into another aluminum can. It's a process called "closed-loop" recycling, and it's recycling in the purest form. We don't need to invent new by-product technologies to make use of the materials we reclaim.

With aluminum, a can becomes a can becomes a can.

Then there's energy, or more accurately,

the high cost of it. It takes 95% less energy to produce aluminum from a used can than it does to make aluminum from ore. So it's an understatement to say it's in our best economic interest to recycle as much aluminum as possible.

That's the reason why scrap aluminum commands such a premium price.

And that's exactly why, in one community program after another, aluminum is responsible for such a phenomenally high percentage of the total recycling revenue.

So don't be misled by those bags sitting at the curb. They may look similar, but the economic reality is, they couldn't be more different.

The bag filled with aluminum is worth many times more than a bag filled with anything else.

That's a fact you can take to the bank. Which is precisely what they do in Dakota County, Minnesota.

To learn more, write
Community Recycling,

The Aluminum Association, 900 19th Street, NW,
Suite 300, Washington, D.C. 20006.

Aluminum Pays.

STOP!

HAVE YOU SEEN THIS PAGE BEFORE?

This magazine is printed on Cross Pointe recycled paper. So, for all you know, this page could once have been a Manhattan parking ticket. Or last year's McDonald's Annual Report. Or Duane Betsky's old anthropology textbook. It could have been an IRS computer printout. A tax refund envelope. Or even a discarded entry in the Publishers Clearinghouse Sweepstakes. ■ Because that's what true, premium-quality, recycled printing paper is all about. It's been used before. And, if you cooperate by recycling this magazine, this page will be used again. To save the environment and room in our landfills. ■ And who knows, the next time this page comes back to you it could be an invitation to dinner at the White House. Or maybe your son's report card. ■

To learn more about Cross Pointe recycled papers, call your nearest paper merchant.



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IN THE DUMPSTER

What we could do without: those slick skills in their grassroots' garb.

Cover illustration
by Gary Tanhauser



I've Bin Thinking

OUR RECYCLING EFFORTS HERE at the office are, uh, behind schedule. Derailed, back-burnered, on hold . . . let's face it, what I'm admitting is that we somehow let recycling become a low priority. It's embarrassing. Time to confess.

In our former office in New York, we'd been separating and collecting high-grade office paper, mixed paper, newsprint, glass bottles, aluminum and steel cans, HDPE containers, and mixed plastics. We intended to do the equivalent here. Yet we haven't even gotten around to redeeming our soda cans. What's up with that?

Three excuses rush to my rationalizing lips. (1) Setting up an office recycling program is hard. (2) It becomes a low priority when you're short-handed. (3) It doesn't seem as critical as it once did.

Wait! Before you call me a hypocrite and hurt my feelings, please give me the rest of this page to work out renewed commitment for myself.

(1) Yes, it is hard. We haven't yet renovated the part of the office where we'll put the enormous storage bins. (Other locations are inconvenient or — horrors — unaesthetic.) And it's time consuming to create a system and train people.

But I should know by now that, once set up, the system runs itself and does indeed save money on garbage hauling.

(2) We are short-handed, owing to the recession that's made other companies, too, reorder their priorities. On any given day of deadlines and missed opportunities, it seems ill advised to concentrate on our trash rather than the business at hand.

We don't have time during a crisis to clean up our own mess! That's the old way of thinking, though, isn't it? The whole point is that personal responsibility has to be part of doing business. We can't feel good about pulling out of a recession if we let go of responsibility during the bad times, any more than we should feel good

about a hike in the GNP if we had to pay for it with a fouled nest and a bleaker future for our kids.

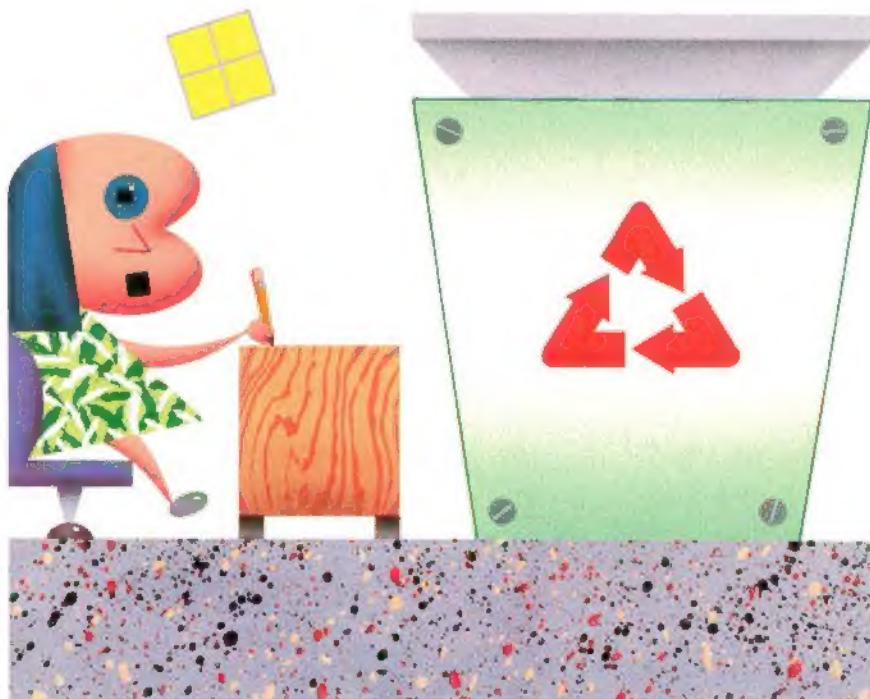
(3) My third excuse — recycling isn't that critical — sounds cynical, but I don't mean it that way: Recycling is only one of many ways to take responsibility for our use of resources, and not a particularly significant one (yet). Even our commitment to buying recycled paper is more important than collecting mixed paper waste.

But I have to remind myself that even as I see the limitations of recycling, even as I know it's no panacea and it's beset

by supply-and-demand vagaries — I can still believe it's worth doing. How your business fares is the result of many thousands of decisions; how your child grows up is the result of consistent love and discipline, day in and day out; how the environment looks in a hundred years will be the result of lots of small steps.

Memberships in environmental organizations have dropped; recycling programs are derailing or being cancelled nationwide. I think I'm beginning to understand the apparent apathy that Americans are showing: People realize that environmental commitment is harder than they thought, and they're concerned with more pressing priorities, and they're skeptical that a town recycling program could really save the earth.

And I know what to do about it, too: Get my arse downstairs and figure out where to set up those bins.



GARBAGE



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Recycling... It Only Works If Trash Becomes Cash

You — collect your paper, your plastic, your glass, your aluminum, your steel — your recyclable trash.

You — your town, your city or your county collect the trash and make it available for recycling.

Then What?...

Industry — can take your collected trash and find a use for it. Until that material is used to produce a new product, the recycling loop is incomplete.

Sonoco — a major producer of industrial and consumer packaging products has been using recovered paper since the 1920s to produce new grades of paperboard. That board is then used to make new products like tubes and cores for industrial carriers, fibre partitions, composite cans and other products for customers in all major industries. We use more than a million tons of recovered paper annually. We have developed a new plastic grocery sack with 25% recycled content. And we continue to work on new uses for recovered materials.

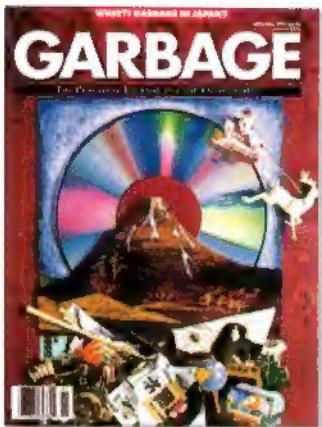
Recycling works as a partial solution to our world's solid waste problem when profitable products can be made from the collected materials — when cash can be made from trash.



Sonoco Products Company

P.O. Box 160-A09 Hartsville, South Carolina 29530

LETTERS



Happy Hempers

I'M THE LAST PERSON TO FAVOR prohibiting useful plants, especially if they make people laugh. But do you smell that old sickly-sweet scent in the fact-checking room? I was surprised to read in the Nov/Dec issue that hemp produces ten times as much biomass per acre as corn. According to the Wisconsin Department of Agriculture and Consumer Protection, the average production of corn silage was 14 tons per acre in this state in 1990. Although chemicals are generally used in silage production, organic or low-input production levels are in the same league. So whence the ten-fold figure?

Incidentally, corn also grows in about 100 days. And in either case, the net energy, not the gross biomass output, should determine the suitability of a biomass operation. Some people say corn is a net energy loser, something that could be true of hemp as well.

DAVID TENENBAUM
Madison, Wis.

Amy Martin responds:

The figure is from an extensive study done by the U.S. Dept. of Agriculture in 1973, which assessed hemp at 15,000 pounds of fresh hemp per acre, according to Larry Serbin, executive director of Business Alliance

for Commerce in Hemp. When you consider that was based on the less efficient farming and harvesting methods of the time, the hemp mass per acre could be more. But no one's been able to do a study, as marijuana was illegalized in 1932. After the carbohydrates to make biofuels such as ethanol have been extracted, hemp does double duty and also produces 750 pounds of excellent quality fiber for paper and textiles per acre.

AMY MARTIN'S "PETRO-CHEMICAL Alternatives" was a breath of fresh air — the first time I have seen the versatile hemp plant extolled in a non-drug-related publication. Your courageous decision to go ahead with this story, against the rising tide of anti-drug hysteria that drowns out rational thought in this country, should not go unrecognized. GARBAGE is the ultimate in "counter culture."

WILLIAM STONE
Laytonville, Calif.

WE WONDER WHY THE Department of Energy's Solar Energy Research Institute is not experimenting with hemp. This seems especially peculiar, since SERI is reported to be investigating hybrid poplars and the perennial switchgrass. The former are perhaps best used as carbon sinks. The latter presently yield on 6-7 tons per acre, with a goal to reach 10, a 50 percent increase in yield. Hemp already yields 10 tons per acre, yet researchers like Mr. Hinman have not begun to research its potential!

The utilization of hemp may be "a serious jolt to the status quo," but readers of GARBAGE know that the status quo needs jolting.

STEVEN S. EPSTEIN
MASS. CANNABIS REFORM COALITION
Marblehead, Mass.

Garbage in Japan

RE: PHYLLIS AUSTIN'S ARTICLE ON waste management in Japan (Nov/Dec 1991): Ms. Austin indicates that the Japanese are generating more and more garbage and suggests that the research carried out by Dr. Eugene Salerni and myself for INFORM on Japanese waste-management practices would not support that fact. However, Chart 1 on p.12 of our INFORM report, "Garbage Management in Japan," clearly documents, in grams and tonnage, the growth in the Japanese municipal-waste stream from 1967-1983. Why does she imply we would disagree?

Ms. Austin quotes a Japanese official as stating that the potential for more recycling in Japan is negligible and again implies that our research would not endorse that fact. However, on p.66, we quote three Japanese officials from three different government agencies as stating that Japanese officials do "not believe that Japan can so much better" in recycling (3%, maybe).

Ms. Austin also sets up our work as being in disagreement with the fact that incineration in Japan is the government's preferred waste-management option. And yet the first sentence of

Chapter 6 states, "Incineration is regarded by the Japanese as the most sanitary method to treat wastes (p.67)."

Ms. Austin also intimates that my work and the work of Dr. Howard Levenson (and, though she omits her contribution, Dr. Kathryn Wagner) at the Office of Technology Assessment diverge. Ms. Austin never indicates to your readers that as a principal contractor to OTA it was I who led the OTA research tour to Japan two years after my initial research there for INFORM, and that I was a collaborator in establishing OTA's findings. I view OTA's work in Japan as an update on my initial research and, needless to say, I endorse, and always have, OTA's findings regarding Japanese waste-management practices.

By the way, Ms. Austin also got my position at NRDC wrong: I am a Senior Scientist, not an Attorney.

ALLEN HERSHKOWITZ, NRDC
New York City

Phyllis Austin responds:

Dr. Hershkowitz's comments that reference his book would have readers believe my article was a



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LETTERS

critique of his and Mr. Salerni's research. It was not. It was based on a two-week visit and interviews with various environmental, government, and industry representatives. His book was a minor citation. He misreads the article's section on incineration.

My apologies to Dr. Hershkowitz regarding my error on his position at NRDC.

EDITORS' NOTE: Readers may wish to take a look at the OTA report "Facing America's Trash: What Next For Municipal Solid Waste" (1989). The Government Printing Office is currently out of stock, but libraries with good-sized government documents collections generally will have it. (Library of Congress #89-600716)

Appliance Compliance

YOUR STORY ON RECYCLING appliances (Nov/Dec '91) mentioned the new Wisconsin law regulating release of CFCs during recycling. It's important to note that a new federal law actually goes into effect at about the same time. As of July 1st, 1992, anyone disposing of air conditioning or refrigeration appliances or servicing these appliances must capture refrigerant and either recycle it on site or send it to a manufacturer to be reclaimed.

There is certain to be a lag between the time these regulations go into effect and actual widespread compliance. Few repair contractors now have the equipment needed to comply. The EPA has very limited resources for enforcement. This is a terrific opportunity for individuals to make a difference, by insisting that their own repair people capture all refrigerants.

CONNIE CLOAK
Lebanon, Tenn.

Your article stated that utility-sponsored refrigerator recycling programs are keeping "ozone-depleting CFCs out of the atmosphere." I wish it were that simple!

The newest refrigerators contain five times more CFCs in the foam insulation than in the coolant. Almost all of it is released to the atmosphere immediately when recyclers shred the foam.

CHRIS CALWELL, NRDC
San Francisco

The Dark Underside

THE VERY WORD, THE BRAZEN caps — GARBAGE — it cannot be but an indictment of the dark underside of modern culture. GARBAGE has the daring to approach a topic that, once addressed, is enmiring. Beyond the easy steps — sorting, composting — lies a trail of ever-increasing inconvenience. Stop driving your car. Live in a teepee. Don't have kids.

Wait a minute! A magazine is a leisure-time activity; a magazine should be self-indulgent! Magazines are garbage! GARBAGE is like an Escher print. A hand reaching out of a magazine and grabbing me by the throat. But ... I love it, for some odd reason. It proves that I can handle the ambivalence.

They say the great American novel has always been about recognizing one's complicity in evil. And baby — you don't get that in *Field and Stream*.

JOEL PATTERSON
North Pownal, Vermont

Real Christmas

I WAS DISTURBED BY HANNAH Holmes' statement in "A GARBAGE Christmas" (Nov/Dec '91) that an artificial tree is "probably a net gain for the Earth" over a real tree because

growing trees on farms results in a decrease in biodiversity and most trees wind up in landfills.

Growing Christmas trees in North Carolina does not result in decreased biodiversity. I have seen deer, grouse, turkey, hawks, and evidence of skunks, foxes, and bear in Christmas tree fields. I have seen wild tiger lilies, jack-in-the-pulpit, trillium, yarrow, blackberries, and a host of other herbs and wild flowers growing among Christmas trees. Old timers tell me that the mountain streams are cleaner and support more trout now that people are growing trees than when they grew tobacco, cabbage, corn, and cattle.

Though some forests are cleared to grow trees, most are planted on old farmland. Growing Christmas trees also allows land-owners a way to make their land profitable, so they don't have to sell it to developers to put in golf courses, developments, and malls.

Christmas trees in North Carolina do not wind up in the landfill, but are made into mulch, used as fish habitat in lakes, and used to stabilize dunes and stream beds. Artificial trees will always wind up in the landfill.

If you would like more information on our efforts using Integrated Pest Management techniques in Fraser fir, please feel free to call me at (704) 433-4050.

DR. JILL SIDEBOTTOM
NO. CAROLINA STATE UNIV.

Morganton, N.C.

I READ "A GARBAGE CHRISTMAS" with great relish — my wife and I have been seeking ways to reduce our materialistic consumption at Christmas, to recycle wrappings, give environmentally responsible gifts, etc... I also noted that Hannah Holmes suggested

some "new traditions to fill the void" once Santa Claus and the usual "what-did-ya-get?" approach have been eliminated. Let me add another one: why not actually celebrate the birth of the son of God?

JOHN CALHOUN
Livermore, Col.

I WAS GENUINELY SHOCKED AT THE completely alienating "holiday hints" section! Page after page of pure Christmas, which did not put me in a holiday mood.

And the most disturbing part? Less than half of the suggestions were actually "Christmas" oriented. Why not "A Garbage Holiday," featuring general suggestions with sidebars for Christmas, Chanukah and Kwanza?

I actually felt personally excluded by this coverage — even *Family Circle* is more fair! Please, think of the rest of us next time, okay?

SARAH DYER
Gainesville, Fla.

Editor Patricia Poore responds: My sincere apologies to readers who felt excluded. I may over-react to feelings of pressure to be politically correct, and I wanted to avoid the "token sidebar" syndrome. My reasoning was that Christmas is the holiday with the worst reputation for commercialism, and in that sense is non-sectarian.

Corrections, Nov/Dec 1991

- "Fallout From the Fireplace" Stewart Farber works for the Yankee Atomic Electric Company in Bolton, MA, (508) 779-6711.
- The caption on p.67 should have read: "Economically and ecologically, washables come out winners over disposables."

Test your **GARBAGE IQ** Take this E-Z Quiz!

1. The term "greywater" generally refers to:

- a. The water surrounding fuel rods in a nuclear plant.
- b. Wastewater from household sources used to water lawns and gardens.
- c. Tainted spring water.

2. When completed, the largest structure in the world will be:

- a. A 42-screen multiplex in the San Fernando Valley.
- b. The Leningrad McDonald's.
- c. The Fresh Kills landfill on Staten Island, New York City.

3. "Compact Fluorescents" are:

- a. New pesticides that are highly concentrated and very toxic.
- b. Energy-saving light bulbs that use 75% less electricity than standard tungsten bulbs.
- c. A new all-midget rock band.

4. **GARBAGE** magazine is:

- a. Your best source for practical environmental information.
- b. Even cheaper if you subscribe for 2 or 3 years.
- c. Printed on recycled paper.
- d. A great gift for that special someone.
- e. Read by top Hollywood celebrities.
- f. All of the above.

Answers:
1-b; 2-c; 3-b; 4-f



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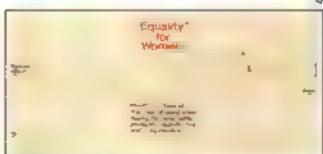
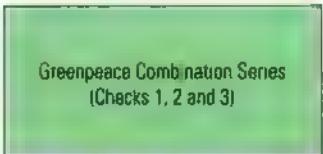
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President, NOW

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LIVING

What Do They Do with Spitballs?

IMBET CHRIS AND CINDY BURGER AND THEIR kids, Jenny and Debbie. Living comfortably in upstate New York, they seem like your typical middle-class family. But they're not. Just look in their garbage can.

The 32-gallon, shiny metal receptacle has been holding the residues of Burger life for a year — and it's not yet full. In an era when waste reduction and recycling are popular goals, the Burgers are pushing the practice to almost unthinkable reaches. And they keep pushing.

"This one can is our failure," apologizes Chris. Consider its contents: an exhausted pair of fuzzy pink slippers, used pens, an unwanted art project, butter wrappers, the plastic-and-cardboard packaging for frozen biscuit dough, potato-chip bags made of melded layers of plastic and paper.

Where does everything else go?

Newspaper, brown bags, corrugated cardboard, white paper, glass, metals, PET and HDPE plastics are easy. The Burgers live in Broome County, where mandatory recycling means these materials, after presorting, are collected by haulers. But other common items, such as cereal boxes, facial tissues, ear swabs, miscellaneous plastics — these have no easy recycling outlets.

But the Burgers make do. They compost their food scraps. They let leaves and grass cuttings lie. In summer, the compost pile also takes paper products which Chris shreds with a lawn mower. Chris knows a recycling firm in Danbury, Conn., that takes mixed plastics.

The Burger family's trash output totals just a can a year.



Purists wouldn't approve of the Burgers' wintertime disposal method for paper: They burn it. Nonrecyclable mixed paper goes into the fireplace, which is fed by outside air vents to promote combustion. Burning is a touchy subject in the Burgers' community, where activists — including Chris — are fighting to kill a proposal for siting a mass-burn incinerator. Chris rationalizes the contradiction this way: If the incinerator folks agree to reduce and recycle as much as he does, they can burn whatever remains.

THE BURGERS



S P E C I A L R e c y c l i n g W e b s i t e & W e b m a i l T o p i c

Other Burger disposal-methods verge on the extreme. This past Thanksgiving, Chris took apart the gizmo in the turkey which pops up when the fowl is fully roasted. "It had a spring to it," he says. "I pulled the spring out, and put it with the metal [recyclables]." Pause. "You can classify us as fanatical at this point."

Chris and Cindy were your average waste-making couple until 1970 and the first Earth Day. As students at the State University of New York at Cortland, they were part of a national environmental awakening. Unlike many of us, though, they didn't slumber through the '80s.

Twenty-two years later, the Burgers have honed their garbage-reducing technique to near perfection and passed on a practical-environmental ethic to Jenny, 13, and Debbie, 10. Before they could read, the girls were taught to sort rubbish.

Now that recycling and reusing are cool, the Burgers are local celebrities. At school, the girls are known as garbage experts, although they shy from the honorific. "They ask me all this stuff," Jenny says of her classmates: "What do you do with rubber bands? What do you do with spit wads?"

Chris and Cindy are quick to say that it's taken them two decades to work out their system, and beginners shouldn't fret over reducing and recycling everything at once. Even so, their ideas aren't revolutionary. They just do it.

— EDIE LAU

Edie Lau is the environment reporter for the Press & Sun-Bulletin, a daily newspaper in Binghamton, N.Y.

Arizona Smokies Go Green?

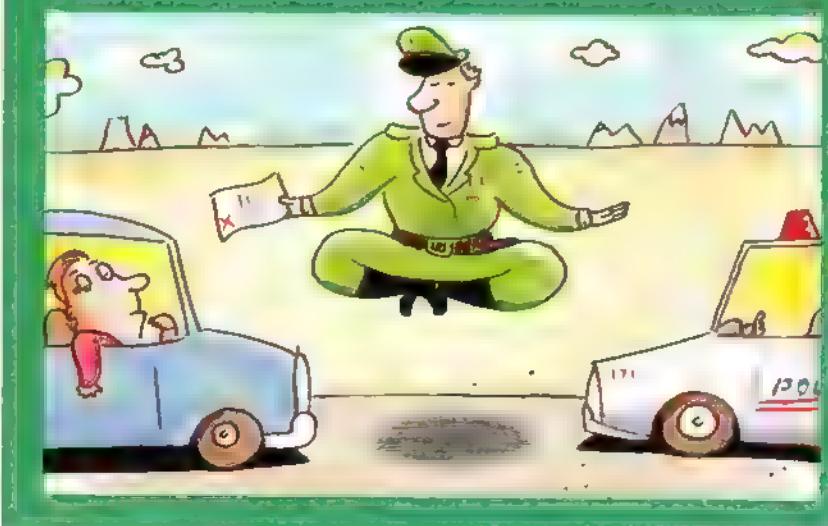
NOT LONG AGO A TUCSON WEEKLY STAFFER WAS DRIVING DOWN Arizona's Route 86 at well, er, more than the legal speed limit. The hapless lawbreaker flew past a patrolman who flicked on his lights, pulled the speed demon over, and whipped out the dreaded ticket book. Imagine said road runner's surprise when the trooper cited her for "waste of a finite energy source."

Our first assumption, that Arizona cops had gone green, was wrong.

According to Harold Sanders, a Department of Public Safety spokesman, wasting a finite energy source is a traffic violation created by the state Legislature some 10 years ago. It seems Arizonans were so upset about being forced to drive 55 mph or less on certain roadways that lawmakers decided to create a new civil offense for anyone caught driving between 56 mph and 65 mph, the speed limit for Arizona's interstates.

"The law had to be titled something tactful," says Mr. Sanders. Too bad cops can't also ticket errant lawn sprinklers, restaurants with patio misters, or land developers for wasting water and desert ecosystems.

— Reprinted with permission from the Tucson Weekly.





Somewhere there are people feeling pangs of nostalgia for that great '80s game, whoever-gets-the-most-stuff-wins. Well, the game isn't over. You can now buy designer garbage cans!

For a mere \$250 the sophisticated waste generator can ensure that his or her garbage will make just the right fashion statement in a stunning leather and vinyl outfit by Palio, available through The Knoll Group in Pittsburgh. Perhaps you prefer something in plastic? I.L. Euro in New York markets the Italian Kartell company's wastebasket, designed by Giotto Stoppino. The elegant, cone-shaped contraption comes in three different models (each available in white, black, or red) and runs between \$65 and \$120. Flame-retardant models cost a bit more.

Then there's the FlexCan, made by Illinois-based Design Ideas, priced at a recession-reasonable \$13. Designed like the elbow of an old-fashioned drinking straw, the can "is a great way to improve your shot percentage or to encourage children to put garbage in the correct spot," says Design Ideas' Alice Van Meter.

The FlexCan is available at many organizer stores; The Container Store in Dallas, Texas, will ship anywhere. Contact: The Container Store, Department GM, 13405 North Stemmons Freeway, Dallas, TX 75234-5767; (800) 733-3532.

If you really must have the fancy cans, contact The Knoll Group, Westinghouse Building, Gateway Center, Pittsburgh, PA 15222; (800) 445-5045.

Also: I.L. Euro, 900 Broadway, Suite 902, New York, NY 10003; (212) 477-3188.

PICTURE THE PILE



The Garbage Index

Nukes & Fruits

Total energy generated worldwide, 1958: 1,901 terawatt-hours

Nuclear energy generated worldwide, 1990: 1,908 terawatt-hours

Nuclear-industry opponents' estimated cost of producing one kilowatt-hour using nuclear power, 1979*: 3.06 cents

Nuclear-industry advocates' estimate, 1981: 1.21 cents

Opponents' estimate, 1989: 10.55 cents

Advocates' estimate, 1990: 2.19 cents

Amount of U.S. spent nuclear fuel rods kept in temporary storage: 21,800 tons

Amount kept in permanent-disposal sites: 0

*Dollar amounts not adjusted for inflation.

Sources: International Atomic Energy Agency, Komanoff Energy Associates, U.S. Council for Energy Awareness, Worldwatch Institute

Approximate number of named apple varieties, worldwide: 10,000

Number of varieties accounting for 90 percent of apples sold: 13

Most popular eating fruit until the 20th century: Persimmon

Per-capita consumption of oranges, 1990: 13.4 pounds

Per-capita consumption of candy, 1990: 19.8 pounds

Sources: N.Y. State Agricultural Experiment Station, Lee Reich, Author of Uncommon Fruits Worthy of Attention
United Fresh Fruit and Vegetable Association, National Confectioners Association

Type of activity responsible for the largest portion of household-hazardous waste in a

low-income neighborhood: Automotive repair

...in a middle-income neighborhood: Home maintenance

...in an upper-income neighborhood: Lawn care

Source: The Garbage Project



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LIFTING THE UD

Take a Letter, Operator

NAN ERA WHEN PRESIDENTIAL candidates give out 800 numbers during debates and phone sex is considered a safe alternative to the real thing, add to the list a new service called Tel-A-Letter.

Say you're bugged by the destruction of old-growth forests, but you just can't get up the energy to write a letter. Call Idaho-based U.S. Consensus, and with the touch of a few buttons they'll assemble four precomposed letters for you. They print them up on "customized stationary" and send them to you with the names and addresses of four decision-makers, such as your senators and congressmen. You — can you handle it? — have to do the envelope.

"Ninety-five percent of the American public has never written to a representative — no matter how upset they were," says Jeff Miller, president of U.S. Consensus. "Staying motivated long enough to sit down and write is not easy."

The call costs \$3.95 for the first minute and one dollar for each additional minute. The number, if you can stay motivated long enough to dial, is (900) 933-ISSUE.



Rootin' Tootin' Dozers

THERE ARE MANY WAYS TO BREAK AN EGG: A chef cradles it in one hand and cracks it deftly against the rim of a bowl. Then there's the dozer method: The egg is perched atop an orange traffic cone and tapped open with the two-inch-wide tip of the seven-ton steel blade on a landfill bulldozer.

It's all part of BFI's International Truck and Heavy Equipment Rodeo. There are events for front-end loaders, rear-end loaders, roll-offs, dozers, compactors, and scrapers. At the most critical times, drivers are blinded by their bulky trucks. But there are no pile ups! These guys know their equipment.

They know their safety, too: competitors can't have had a moving violation (on or off the job) for a year, or any preventable motor-vehicle accident, or any drug- or alcohol-related offense within ten years. With the dangers inherent in both garbage itself and the heavy equipment used to manage it, the emphasis on safety isn't news to anybody at the rodeo.

The wave of rodeo-mania that rushes through the solid waste collection industry has its purpose — not the corporate bottom line, but the human values of workers rarely recognized for their skills.

I was glad to be invited. It was awesome.

— BILL RATHJE

FURTHER READING

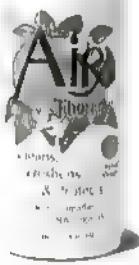
"I can smell that french fry coming down the road."

— OSCAR PATTON talking about his friend Linda Wlchinsky's car, which runs on used vegetable oil. (Wall Street Journal, Nov. 8, 1989.)

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We're Saving the Waves, Dude

SURFERS AREN'T OFTEN NOTED FOR their environmental activism. But when the waves off Humboldt County, California — one of the best surfing spots in the state — began turning black with contaminants and causing nausea, headaches, sore throats, skin rashes, and sinus infections, California surfers didn't just call it a bummer and walk away.

Beginning in 1984, the nonprofit Surfrider Foundation documented more than 40,000 violations of the federal Clean Water Act by two California paper companies which were dumping 40 million gallons a day of untreated waste into the waters off northern California. The result: The companies agreed to pay \$5.8 million in fines and tens of millions more for new waste-treatment facilities and better waste-disposal equipment.

The settlement, the second largest ever under the Clean Water Act, set a major precedent by requiring that the standard for measuring pollutants in the mills' effluent be based on observation of affected sea creatures, instead of an abstract numerical evaluation. One other, exquisitely ironic requirement: All company reports and correspondence dealing with the Clean Water Act must be printed on recycled paper.



Environmental Careers, Jan/Feb '92: U.S. News and World Report

UPDATE recently named industrial hygiene as a hot environmental career track. Industrial hygienists identify environmental hazards in the workplace and help devise solutions. With some tough new environmental laws on the books and the public's heightened awareness, environmental safety is increasingly viewed as part of the cost of doing business. That should mean more environmental jobs. American Industrial Hygiene Association, 345 White Pond Drive, P.O. Box 8390, Akron, OH 44320; (216) 873-2442.

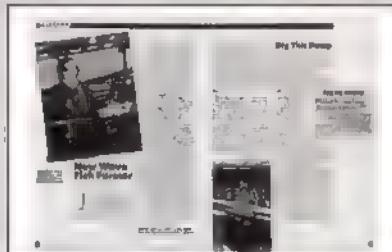
Environmental CAREERS

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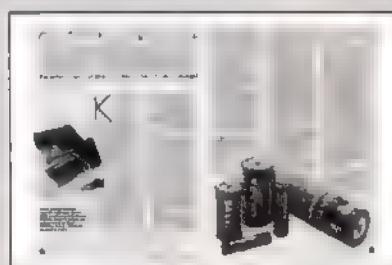
Paper Chase, Jan/Feb '91: Every month we get calls from readers asking about the food service at Bowling Green State University in Ohio,

UPDATE where they substituted washable glass for much of their disposable paperware and saved a hefty chunk of change in the process. Jane Schimpf, the university's director of food operations, reports that the program is continuing just fine, and they've even added a few features. Students are now issued mugs — the old-fashioned reusable kind — for their study jolt of java to-go. Serving trays are reusable now, too. For more information on Bowling Green's money-saving, waste-reducing program, contact: Food Operations, Centrex Building, Bowling Green State University, Bowling Green, OH 43403; (419) 372-7931.



Getting Rid of Batteries, Sept/Oct '91: Apple Computer Company has

UPDATE instituted a battery-recycling program for its customers. The primary batteries in the company's portable, laptop, and notebook-sized computers die after about two years and their heavy metals make them bad candidates for the local landfill or incinerator. Customers can now return the batteries to any authorized Apple dealer, who sees that they're safely recycled. Customer Assistance Center, Apple Computer Co., 20525 Marconi Ave., Cupertino, CA 95014; (800) 776-2333.



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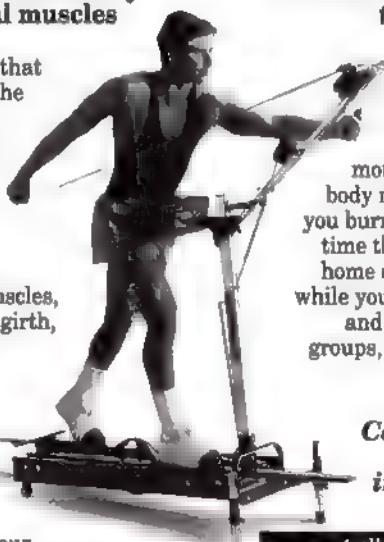
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From Tucson to Armenia: The First Principle of Waste

IN THE SPRING OF 1973, I sorted my first bag of household refuse. The nation was in the throes of a widely publicized beef shortage. In and out of the media, everyone was complaining about the scarcity and high cost of beef, as they described their own personal beef-saving measures.

Imagine, then, my amazement when I discovered a whole T-bone steak in that first bag of garbage. There it was, fully cooked, wrapped in a paper towel, amidst grapefruit rinds and coffee grounds, underneath an empty Cheerios box. The other garbage sorters and I were surprised to find a great deal of once-edible beef thrown out during that season.

Data analysis would show that the high volume of waste (three times the non-shortage rate) was due to the disruption of familiar buying habits. People bought cheaper, unfamiliar cuts of beef and, not knowing how to prepare them satisfactorily, discarded the results. Other people, to hedge against future price increases, resorted to panic buying and stockpiled quantities of meat without thinking about how to preserve them properly.

This peculiar behavior wasn't limited to beef. A similar pattern emerged in the media, and in refuse, during the "sugar shortage" of 1975. Consumers changed their normal behaviors, buying dessert mixes made with sugar substitutes and stocking up on pastries and candy. The result was double the discard of once-edible sweets.

At the Garbage Project, our discovery led us to what we called the First Principle of Food Waste: The more frequently and consistently a food is used in a household's diet, the lower the rate of waste of that food. It makes sense — just think of the potential difference in waste between trying a new recipe and preparing a favorite dish.

The First Principle of Waste explains why garbage sorters find less

so ingredients. These ingredients are continually used and replenished; they don't sit on a shelf and spoil. Moreover, leftovers can be readily incorporated into the next meal.

The Garbage Project discovered, too, that most Tucson households buy and use standard 16-oz. and 24-oz. loaves of bread (about one loaf per week). Specialty breads (hot dog and burger buns, muffins, biscuits, rolls, raisin bread) are bought less often, about one loaf every four to six weeks, and used sporadically. As our First Principle would predict, 40 to 50% (by weight) of specialty bread finds its way to Tucson's landfills, versus only about 10% of standard bread loaves. Sandwich bread is used every day; but hot dog buns or biscuits still in the package get shoved to the back of the refrigerator where they harden behind the pickles. Variety, it seems, is not only the spice of life, it's also the beginning of waste.

Such predictable consumer perversity doesn't stop with food. In 1985 we began recording hazardous wastes in household refuse. It wasn't long before Garbage Project hazardous-waste specialist Doug Wilson

began to see a First Principle of Household Maintenance Waste: The more frequently and consistently a household uses a maintenance product, the lower the rate of its waste. Frequently used products such as detergents and kitchen cleansers are



A whole edible steak, this one raw, turns up in a 1973 sort sample of household garbage: proof that panic buying during a shortage results in more waste.

once-edible food thrown in the garbage of Mexican-Americans than in the garbage of most other Americans. Mexican cuisine offers an immense variety — tamales, enchiladas, tacos, burritos, tostadas, chimichangas — but they are all made from the same dozen or

wasted at a low rate of purchase weight (less than one-half of one percent). Infrequently used renovation commodities such as paint, varnish, stain, glue, and caulk are wasted at more than 10% of purchase weight. Cleaning chores are never finished, but the size of a product container for a renovation project often doesn't fit the size of the job. Something is left over and eventually thrown away.

By 1989, thousands of sorts later, we'd combined the food and maintenance-product principles into one First Principle of Waste. Verification has just turned up again, as fresh as today's headlines, in the landfills of a collapsing empire. Environmental activist Paul A. Soler-Sala, returning from 15 months of travel in what used to be the Soviet Union, wrote to GARBAGE with his insights, one of which was immediately pointed out to me. The most incredible statistic Soler Sala had heard was that food wastes made up close to 50% of the garbage in landfills in places like the Armenian capital Yerevan—where the state-run stores suffer from erratic and extreme food shortages. How could that possibly be? he wondered.

An Armenian friend explained. She said she and her husband and two sons were conditioned by unpredictable shortages in staples, such as bread, to buy as much of any commodity as possible when it was available. (Paul called it "emergency-response buying.") The result, she went on, was often extra loaves of dessicated inedible bread, which got thrown in the trash. Multiply this pattern by the population of Yerevan (1.2 million), and you have one reason, says Paul, for "a landfill that is expanding beyond its predetermined limits."

From chuck steak to porch sealant, and from Tucson to Armenia... nineteen years later, I know my early "amazing find" was no fluke. The uneaten T-bone in my first bag was a telltale sign in the grand scheme of garbage.

Archaeologist Dr. William L. Rathje is founder and director of The Garbage Project and a professor of anthropology at the Univ. of Arizona-Tucson.

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Besieged Butterfly Beats Odds

IMAGINE A PATCH OF WILD Pacific sand dunes, rustling in the sun. The twitch of a rare San Diego horned lizard draws your eye. An endangered El Segundo blue butterfly dawdles on your right. On your left, a Boeing jet lifts off and screams over your head. This is the restoration of 200 of the most besieged acres you'll ever see. Its boundaries: East, the Los Angeles International Airport (LAX); South, a sewage plant; West, the beach and Pacific Ocean; and North, a golf course and suburbs. The dunes themselves are scarred with streets and sidewalks — in the late '60s the LAX took a creative approach to noise abatement by purchasing and bulldozing 850 houses that sat here. That, however, did not halt the spread of suburban ornamental plants, especially the acacia tree, which alters the soil chemistry and produces seeds that can lie dormant for as long as 50 years before springing to life.

In 1985, after years of red tape, habitat reconstruction began. Population geneticist Dr. Rudi Mattoni and 80 volunteers from the Rhapsody in Green organization have since been practicing restoration, seat-of-the-pants style. Dr. Mattoni studies the little food chains to see how invaders are pushing out rare or endangered natives. He then draws up leaflets that help volunteers identify the species they need to plant, pull, or avoid stepping on. Armed with these instructions and bundles of young plants, each volunteer sets out for her own acre.

Dr. Mattoni began with a census of surviving species. Comparing his findings with a 1938-9 study, he discovered the losses amounted to 40 percent of the flowering plant species, 17

of 20 mammals, eight of 15 reptiles, six out of 30 butterflies, and all of the scrub-obligate birds (birds such as wrens and the California quail that depend on bushes

slithering back, too. One volunteer is learning how to raise quail.

But restoring an island in an urban sea will always present riddles. An example: Irrigation (reclaimed water from the sewage facility) helps new plants get a grip — but it also supports the invading Argentine ant, who competes with the drought-hardy red ant, the horned lizard's main meal. Another: Butterflies need grasses; grasses need rabbits to control shrubs; and rabbits need the native kit-fox, whose little mouth won't hold a rabbit. But the non-native red fox (who drove off the kit-fox and ate the bunnies) shows little interest in abandoning his adopted home. As red foxes are trapped and removed, reinforcements sneak in from the north. ■



Volunteers remove signs of the previous occupants of the dune system. Right: The endangered El Segundo blue butterfly.

rather than their stubby wings for protection).

Restoration has focused on the plants, which are the support system for other missing members of the ecosystem. Some critters are responding with enthusiasm. Since 1984, the butterfly's ranks have increased from 500 to 3,000, and the San Diego horned lizard is



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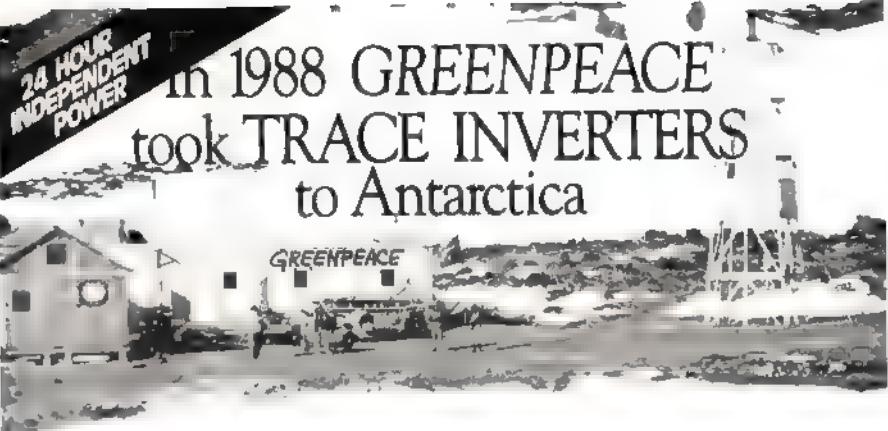
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RECYCLING, INC.

Taking environmental awareness to work • By Amy Martin



Has your office been mugged yet?

That's when the big cheese, enamored of the environmental spirit and in pursuit of positive publicity, swoops through the office with a fist full of ceramic mugs, replacing all those dastardly Styrofoam cups.

Collect aluminum empties in the company break room, scatter a few bins for computer paper, and presto: The environmental office. Sort of "eco lite," isn't it? Ceramic cups are commendable, but just a token

action if the vending machine is full of over-packaged food. Paper recycling is a great idea — and darn near useless if workers wantonly waste paper.

Creating a meaningful office recycling system takes some vision, planning, and cajoling. But once it's up and running, it'll be as self-

maintaining as . . . well, as your weekly garbage pickup. To get started, follow the 11 steps outlined on the next pages, and note my answers to common questions. The ultimate goal: An office run with environmental consideration, where reducing, recycling, and buying recycled are standard operating procedure.

ILLUSTRATIONS BY ROSS P. MACDONALD



I. GETTING STARTED

► **Step 1 GATHER A POSSE, OR "GREEN TEAM."** Almost every major corporate-environmental effort began in just one office wing or among a few desks. Assemble a few dedicated recyclers and identify the main areas you'll need to cover: These include recycling equipment, potential buyers of recycled materials, recycled products to purchase, and promotion and education of staff. Try to have at least one person working on each area.

Help for the Office Recycling Planner

SERVICES

- EPA PROCUREMENT GUIDELINE HOTLINE Over-the-phone information on EPA standards for recycled products and sources of recycled-paper products. Free booklets are also available. 5528 Hempstead Way, Springfield, VA 22151, (703) 941-4452
- AMERICAN PAPER INSTITUTE Aside from offering technical assistance and free publications, API publishes *Papermatcher*, a directory listing all of the country's paper mills and wastepaper brokers; single copies are free. 260 Madison Ave., New York, NY 10016, (800) 878-8878
- INSTITUTE OF SCRAP RECYCLING INDUSTRIES Its directory of members helps locate purchasers of metallic

and non-metallic scrap (including plastics). 1325 G St., NW, Suite 1000, Washington, DC 20005, (202) 466-4050

- NATIONAL OFFICE PAPER RECYCLING PROJECT Coordinated by the U.S. Conference of Mayors, it offers publications and technical assistance. 1620 I St., NW, 4th floor, Washington, DC 20006
- NATIONAL RECYCLING COALITION Helps governments and businesses with publications and technical assistance on recycled products, plus state and local regulations pertaining to them. 1101 30th St., NW, Suite 305, Washington, DC 20007, (202) 625-6406
- NATIONAL SOLID WASTES MANAGEMENT ASSOCIATION Its member's directory helps locate purchasers of materials to be recycled. 1730 Rhode Island Ave., Suite 1000, Washington, DC 20036, (202) 659-4613

Q: What if no one — zip, zilch, zero — wants to join in with me?

A: Do it alone. Be a trendsetter. People don't follow unless they're led.

► **Step 2 GET PERMISSION FROM HIGHER-UPS.** Be casual and low key. Don't present your idea as Wonder Employee's plan to save the planet. Many environmentally beneficial actions, such as reducing waste and recycling what remains, can be presented on their economic value alone. You just have to speak the boss' language.

Of course, you can go it alone. During the time my mate was teaching at a university, efforts to start recycling and waste-reduction practices were soundly thwarted. Undaunted, each semester he collected about an inch of office memos; good quality, virtually untouched (and definitely unread!) white paper that was brought back home for reuse. Mixed paper was also rescued for recycling. He's a good lad.

► **Step 3 SET YOUR LIMITS.** Decide whether you're going to focus only on your group's work area, or include the rest rooms and break room. Do you want to explore air and water quality, energy efficiency, and electromagnetic-radiation fields and other aspects of indoor air pollution; or would it be better to start small and concentrate on waste management (as this article does)?

► **Step 4 DO A WASTE AUDIT.** Peer into the pail and get intimate with your garbage, both coming and going. You'll need to determine, even if just approximately, the following things: how much waste your group produces per week; what's in it, including types of paper, plastic, and metals; how much is reusable; how much is recyclable; how much is unnecessary.

► **Step 5 TO BUY RECYCLED, DO AN INVENTORY AUDIT.** Determine what items your group uses which could be made of

PUBLICATIONS

- Buy Recycled Paper Products Free 12-page booklet with a concise overview and a good resource list. Technical assistance is also available. National Office Paper Recycling Project, The U.S. Conference of Mayors, 1620 I St., NW, 4th floor, Washington, DC 20006, (202) 293-7330
- Recycled Products Guide Catalog of over 1,500 listings under 250 classifications, updated and published two times a year with an additional monthly newsletter. \$195 a year, \$105 for a single issue. P.O. Box 577, Ogdensburg, NY 13669; (800) 267-0707 or (315) 471-0707
- Reduce, Reuse, Recycle, For a Better World Two free newsletters on developing a mixed-paper recycling program and devising ways to use less paper, based on successful programs already in place at 3M and other companies. Contact Linda Grams, Public Relations, 3M Commercial Office Supply Division, 3M Center, Building 225-35-05, St. Paul, MN 55144-1000, (800) 395-1223.
- Building Manager's Recycling Guide Oriented toward commercial high-rises and large building complexes, it covers logistics as well as tips on coping with refuse regulations. Choose from New York, Chicago, or national editions. \$75 ppd. Refuse Consulting Co., 1701 W. Henderson St., Chicago, IL 60657, (312) 327-9361
- Business Recycling Manual Probably the most exhaustive guide on the topic, applicable to literally all types of businesses. Covers waste minimization, recycling, and recycled-products purchasing. Its loose-leaf binder features handy worksheets, a glossary, and a resource directory. \$90 ppd, prepayment required. INFORM, 381 Park Ave. S., New York, NY 10016, (212) 689-4040

recycled materials. Even self-stick notes and file folders are available recycled. Also look for changes that increase recyclability, like return envelopes without plastic windows so they can be recycled instead of tossed. Spending a bunch of money on "While You Were Out" slips? Consider a voice-mail system.

► **S**tep 6 DECIDE ON A GENERAL PLAN OF IMPLEMENTATION. Most businesses, and individuals for that matter, go for the phased-in approach. Jenny Cheek, project manager for distribution at Mary Kay Cosmetics' Dallas headquarters, started a recycling program in her own department. After showing her bosses that her self-initiated efforts took a big chunk out of the garbage-hauling bill and contributed to increased worker morale and efficiency, the rest of the company soon followed suit. (Employees are even encouraged to bring recyclables to work if there are no recycling centers near their homes.)

Jenny Cheek's good idea has broadened to include a waste-reduction program and a recycled-product purchasing policy. Now joined by about 20 other large companies, Mary Kay Cosmetics helped start the Corporate Recycling Council to help other offices get started.

DON'T PRESENT YOUR OFFICE-RECYCLING IDEA AS

WONDER EMPLOYEE'S PLAN TO SAVE THE PLANET. MANY

ENVIRONMENTALLY BENEFICIAL ACTIONS, SUCH AS

REDUCING WASTE AND RECYCLING WHAT REMAINS, CAN

BE PRESENTED ON THEIR ECONOMIC VALUE ALONE.

largest exporter of wastepaper.

► **S**tep 7 REDUCE THE PAPER CHASE. In the (former) Soviet Union, where bureaucratic paperwork abounds, the average office worker uses 25 pounds of paper a year. In the U.S., each of us working stiffs uses an astounding 350 pounds annually, almost one-and-a-half pounds per worker each business day. Repeat after me: Reuse then recycle, reuse then recycle. Avoid using a whole page of paper when a half-sheet will do, and reproduce on two sides of the page when you can.

Q: Is there a law or something that says memos or letters must be a full page even if they're all hot air?

A: Copy short memos two to a sheet and go for other paper-stingy methods, and a good-quality paper cutter (about \$20) can easily pay for itself in paper saved.

Q: What's the scoop on copy machines?

A: I want one, badly. The latest models are darn near idiot-proof, making double-sided copying a breeze. The best models have easy reduction features so that two eight-by-ten pages laid side-by-side can be reduced to one page, or three eight-by-tens to one legal (eight-by-fourteen) sheet.

Q: Our office uses a lot of fax paper. Is it really unrecyclable?

A: Sorry: If it's the thermal type, it's coated with a heat-sensitive film that cannot be removed during the recycled papermaking process. Plain-paper fax machines are available, although they're generally more expensive than those using thermal paper.

► **S**tep 8 REDUCE OTHER WASTES. Why stop at paper? Campaign for the return of refillable pens and tape dispensers. Get that ribbon reinked or ink cartridge refilled instead of trashing them.

Q: I remember my grandfather once had a refillable pen that wasn't one of those expensive Cross-type pens which I won't invest in because of pen thieves. Are they still around?

A: Yes, you can still buy affordable, refillable ballpoint pens. Paper Mate markets a refillable called Flexgrip for under a dollar. As for pen thieves, you can only hope they'll refill them.

Q: I hear you can refill cartridges for laser printers. Is this really a landfill problem?



III. WASTE REDUCTION

REMEMBER THE PAPERLESS OFFICE THAT THE PERSONAL COMPUTER was to have made possible? It also brought about the Information Age, and much of that information (however electronically manipulated) eventually ends up on paper, even if to be read once and discarded. Since 1970, paper use across the country has almost doubled, an increase exceeded only by our use of plastic. Now, the U.S. is the world's largest user of paper as well as the

A: Everyone should be responsible for their part of the waste-flow. But the savings are enough to convince almost anyone: A refilled cartridge costs half as much as a new one. In most cases, the empty is mailed in or picked up in exchange for a full cartridge. Xerox (800) 822-2200 and IBM's Lemark (800) 848-9894 are two ribbon makers with return programs; some parts are reclaimed from discarded cartridges and the rest are recycled or dumped.

Companies like NEWPRO, (800) 752-3403, recharge all brands. To find a cartridge refiller, look in the business directory under Copying, Duplicating, or Photocopying Machines and Supplies; or contact the International Cartridge Recycling Association, 1101 Connecticut Ave., NW, Washington, DC 20036; (202) 857-1154.



III. PAPER RECYCLING

IN ALL ITS FORMS, PAPER COMPRISSES MORE THAN 40 percent of landfill weight and volume, making it the waste stream's single largest component. According to the EPA, the amount of paper destined for disposal has doubled since 1960 and is climbing.

■ **Step 9 LEARN ABOUT PAPER.** Office wastepaper is largely made up of bright, uncoated fibers with good strength characteristics. This makes it an appealing resource for recycled-paper manufacturers if it can be found clean (uncontaminated by lower quality paper). Its value depends on the demands of the scrap paper market, which varies according to region and market fluctuations. Here's the basic breakdown of paper types, in

descending order of current market value:

#1 — COMPUTER PRINT-OUTS, OR CPOs These are plain white or green-bar, data-processing-type papers. Some contain perforated, tractor-feed margins that are usually torn off the pages. Paper buyers like them because there's less ink to remove during the papermaking process.

#2 — WHITE LEDGER PAPER They include stationery, typing, computer-printer, and copy-machine papers, quality bond-style only. A small amount of color in the letterhead is acceptable. These are high-quality papers that don't contain a lot of ink. They're ranked #2 because they need a little more processing to make them into recycled paper. Laser-printed paper is the same as white ledger paper, except a laser printer fuses the image onto the paper with heat, making it very hard to remove the ink. Colored ledger paper includes dyed paper with very colorful letterheads or dense graphics of colored ink. Some companies will not accept paper of a deep or dark hue.

#3 — CORRUGATED CARDBOARD This is the strong, thick type that has a waveform structure sandwiched between two brown or kraft-paper linings. Remove vinyl and plastic tape before recycling — they're the major contaminants during recycled papermaking.

#4 — MIXED PAPER This category includes manila folders, index cards, and other stiff paper; brochures, product inserts, junk mail, and advertising circulars made from clay-coated, groundwood, or ledger paper. Kraft-paper products such as brown grocery and retail sacks, padded mailers, and envelopes are included in this category or are mixed in with corrugated cardboard. Chipboard, the thin cardboard from which most product packaging is made, is considered mixed paper; always remove any plastic before recycling. Magazines, directories, and documents with gummed or sewn bindings are considered mixed paper, but are often separated for recycling. Because mixed paper is usually turned into coarser products like chipboard packaging, this is the only category in which contaminants (other paper types) are tolerated.

Q: Do we really have to sort all of these types of paper?

A: Generally, the more you sort, the better price you'll get for wastepaper. Why? Wastepaper brokers, as paper buyers are called, take only the kinds of paper that they can sell.

Processors of waste paper which are associated with paperboard producers like Rock-Tenn or tissue producers such as Fort Howard often use what they term commingled paper. This grouping includes colored and white ledger paper of all grades and thicknesses, even laser printed, and many paperboard products. A small amount of non-paper contaminants is also allowed. But even commingled has restrictions. Fort Howard will permit only a small amount of groundwood and kraft paper.

■ **Step 10 FIND A PAPER BUYER.** Make arrangements to get your wastepaper to the recycling plant.

Q: The paper buyers go on and on about contaminants. Why are they so uptight about it?

A: Contaminants, usually non-paper products such as plastic and metals, prolong if not ruin the papermaking process. Mills must produce a consistent product on a set schedule. If wastepaper sources change from week to week, then papermakers would constantly have to rewrite their recipes to accommodate the different ingredients. A papermaker needs to receive a consistent supply of clean, homogeneous wastepaper.

Contaminants commonly found in office paper include envelopes with gummed labels, bindings, or seals; envelopes with plastic windows; stationery or envelopes with metal embossing; carbon paper; thermal fax paper; vinyl or plastic tape.

Of these, gummed or pressure-sensitive labels and seals are the most frequent contaminants. (Water-based paste like that used on stamps and most envelopes is not a problem.) Because envelopes often have metal clasps and plastic in the form of windows or tape, some offices find it easier to simply not recycle envelopes at all.

Q: Our office is so small that the paper buyers won't pick up our bundles. What can we do?

A: Hi-ho, hi-ho, it's off to the recycling plant you'll have to go. Many wastepaper brokers require a hefty number of pounds-per-load before they'll even consider buying your stuff, much less make an office call. To get sufficient volume, network with other offices in your area to see if you can form a recycling cooperative.

RE: OFFICE WASTE ESTIMATED WASTE GENERATED

BY OFFICES, 1990: 15.5 MILLION TONS. PORTION

COMPRISED BY PAPER: 70.3%. ESTIMATED INCREASE IN

OFFICE USE OF PRINTING AND WRITING PAPER FROM

1960 TO 1990: 405%. SOURCE: FRANKLIN ASSOCIATES, LTD

If your office contains extensive data-processing operations and hundreds of employees, paper brokers may advise you on ways to maximize recycling efficiency; collection systems are often provided free. Unless the wastepaper is extremely clean, well sorted, and of very high quality, your company won't take in any money if wastepaper is collected on site. Instead, businesses see savings on the reduced need for conventional trash service.

► **S t e p 11: SET UP OFFICE COLLECTION SYSTEMS.** The more usable a collection system is, the more you'll recycle. Any paper-recycling system requires some training and education, so places with high employee turnover should stick to simple systems.

Q: What about containers?

A: Square collection-containers work better than round and flat works better than vertical. (A set of square, stackable plastic crates also works well.) Most offices place their used computer print-outs back in the boxes the paper originally came in. Be sure to label collection containers according to paper type.

To increase participation, put a container at every desk. In cramped spaces, plastic vertical files or cardboard magazine holders are good choices. A collection box or crate by each copy machine and computer printer is a must. Workers empty the small collection units into large bins, which should be on wheels.

Office Recycling Product Suppliers

There are hundreds of companies that manufacture products for office recycling. The following is a brief list of some of them.

OFFICE RECYCLING RECEPTECLES

• **One Earth Corporation** 5200 W Roosevelt Rd., Dept GM, Chicago, IL 60650; (800) 484-4174 ext 5976; (312) 378-3062.

They'll give you guidance on setting up your program and help put you in touch with companies who will pick up what you have collected.

• **Windsor Barrel Works** P O Box 47, Dept GM, Kempton, PA 19529, (800) 527-7848. Steel containers well suited for collecting paper. Official UL listing as fire safe and self extinguishing.

• **CSL & Associates** 120 Churchill Dr., Dept GM, Dunwoody, GA 30350; (404) 396-2949. CSL is in the crushing business. Their "Can-Pactor" will crush and store cans (better for non-bottle-bill states).

• **Eldon-Rubbermaid** 1130 E. 230th St., Carson, CA 90745; (800) 827-5060. Recycling bins and handsome desk accessories made from recycled plastic.

RECYCLED PAPER AND PRINTING SERVICES

• **Crestwood Paper Co.** 315 Hudson St Dept GM, New York, NY 10013, (800) 525-3196. Supplies large and small quantities of recycled paper and offers ecologically sound printing services.

• **Alonzo Printing** 1094 San Mateo Ave., Dept GM, S San Francisco, CA 94080, (415) 873-0522. Supplies recycled paper;

uses only soy-based ink.

ENVIRONMENTAL OFFICE PRODUCTS

• **Boyd's Office Products** P.O. Box 1059, Dept GM, Jackson, MS 39215, (800) 753-1379. Boyd's offers a wide variety of office products made of recycled materials. Will help you design your office recycling program.

RIBBONS AND TONER CARTRIDGES

• **The Ribbon Factory** 2300 E. Patrick Lane, #23, Dept GM, Las Vegas, NV 89119; (800) 275-7422. Reloads old ribbons and cartridges at half the price of new ones.

• **Dade & Mansfield**, 2245-205 First Street, Dept GM, Simi Valley, CA 93065, (805) 583-3453. Supplies remanufactured, refillable toner cartridges and recycled office products and services.



Parting the pine boughs at the edge of Cobboseecontee Lake in the willies of Maine, you hearken to voices. In the sunset-warmed clearing, you make out a group of men and women circling, and singing. "Power of raven be thine. Power of eagle be thine. Goodness of sea be thine. Goodness of Earth be thine." There is a lot of loose cotton clothing. Stashed in the cabins and tents, there are drums. Look sharp and you might catch someone smooching a fir tree. — Have we stumbled on a reunion of back-to-the-landers? Is it Timothy Leary's birthday? Nope. These folks are bioregionalists, and the nerdy unpronounceability of their name is a clue that this is not the group that's been smokin' dope for 20 years. — The adherents of bioregionalism (which translates roughly to "life region"), be they country mice or city mice, have learned that living in harmony with the Earth is more than a groovy state of mind: It requires hard study of the species you share dirt with, and hard work repairing habitats so that the ecosystem stays on course. — See, earlier cultures depended on their home regions to meet every need — food, shelter,

Being Bioregional

The environmental wisdom of getting to know your place in the world — by Hannah Holmes

clothing, and entertainment. As a re-

sult, they knew their homes intimately: when each fruit ripened, when the fish ran, which wood made the best tools. — Our globe-trotting lives no longer seem to depend on this knowledge, so we trust someone else to learn it. But little signs like global warming and mass extinctions are saying that someone else isn't doing a great job of keeping our ecosystems healthy. If all goes as the bioregionalists plan, everybody will quit the globe-trotting, and choose an ecosystem to call Home.

As we learn the intimate details of our homes, we'll begin treating them with respect. United by common values, we'll coalesce in small, self-sufficient communities, and the remote federal governments of today will disperse on the breeze. The world will be saved.

Sound like more than you had in mind for the weekend? You don't have to do it all at once. Here's how to start.

DO YOU KNOW WHERE YOU ARE? SILLY QUESTION, ON THE surface. But how much do you really know about the patch of Earth that sustains you? Where do your air and water come from? Would you recognize the smell of the soil that lies under your sidewalk? How many legs do your local mosquitos have?

While you can learn a lot about the plants and animals of your area from natural-history books, you need to get outside to see, hear, smell, touch, and taste how your area really works. Start small. Put out a bird feeder. Follow a beetle across your lawn. Taste the nectar from a pink clover flower, and the soft shaft of a grass stem pulled slowly from its outer wrap.

Then move on to bigger things. Make a map of your surroundings. Mark the rivers and streams, the stand of big oak trees, the damp hill where edible coral mushrooms grow, and where you see rabbit tracks. Leave out the city, county, and state lines.

A calendar or diary is another place to collect your knowledge. Note the appearance of the first robin in spring, when the linden spreads its leaves, when the gray whale plows past, and the direction of the wind in different seasons.

The next time you need to fly somewhere, take the window seat and get an aerial look at the place you call home. Admit it: From up here, you haven't a clue where Somecity ends and Anystate begins. Well, that's how nature sees it all the time. (See the centerfold, p.38.)

Nature has its own methods of dividing things up. The snowy owl and the barn owl, for example, share a taste for small rodents, but the snowy owl keeps to the snowy north while the barn owl dines in warmer climes. Likewise, pine trees avoid deserts, and palm trees shun rocky mountaintops.

It's this sort of boundary that bioregionalists try to honor. But how to decide where your bioregion begins and ends? Three options are "biotic shift," (a large change in flora and fauna), altitude, and landmarks such as a mountain or lake. Many organized bioregions also adopt a "defining species." The salmon walks tall in the Pacific Northwest, the oak in the Ozarks, the raven in the plains.

But water is the simplest boundary-marker. Not only is it easy to follow (water marks its path by carving mountains and hills), but as an essential to life, it has instinctual appeal. Thus the Ish River bioregion in British Columbia is named after a handful of rivers ending in the suffix "-ish." The Gulf of Maine bioregion, defining an area stretching into Canada and Massachusetts, is characterized by a fan of water rushing to the Atlantic.

PREVIOUS SPREAD: Thomas Hart Benton's *July Hay*, 1942.

Green Movie

Rocky Sote is an ecological curmudgeon.

Gary Snyder [the green poet] says a person

do. You just have to live more.

brownstone well to dangle over his desk.

is a good person.



Columbia University, 1991, Photo, New York



THOMAS HART BENTON'S ROASTING EARS, 1938

Whence comes the water you drink? What other critters and plants depend on it? The answers begin to define your bioregion.

ON AN APRIL DAY, A ROADRUNNER SKITTERS INTO DOWNTOWN Santa Fe. It's accompanied by a rattlesnake, a piñon tree, a coyote. Close behind come frolicking antelope, mosquitos, red-tailed hawks, and river otters. A rabies epidemic? No, it's the annual All-Species Day, and costumed schoolchildren are standing in for the shy or immobile beings. The parade, which last year scooped up about 10,000 revelers, winds up in the park, where the pageantry begins with a dance of whirling wolves and buffaloes. The children — and all the participants in the All-Species events — are learning to identify with non-human forms of life.

In the bioregional mind, all critters are created equal. So when bioregionalists meet to discuss policies, a few people actually leave the circle of discussion, and "become" other species, speaking only through an interpreter. It is their role to interrupt the proceedings whenever they sense that their constituency is being slighted. Thus, at the 1990 North American Bioregional Congress in Maine (NABC IV), a discussion of bioregional education paused when an interpreter entered the circle. "We have a message from the spider," she said. "Spider is asking that you leave her

where she is. You take the class and lead them to her."

Goony as the ritual may sound, trying to speak for another species is an education in itself. "Difficult indeed," writes David Abram, who co-hatched the idea. "It requires listening with one ear to the human speakers while lending the other to the wind whispering in the trees, to the churning voices of the river, to the beating of one's own heart."

It also requires a firm knowledge of a bug's or bush's biological and ecological needs, as well as a familiarity with the "personality" of the species — all worthwhile information, even if you never get the calling to speak for the bushes at the local zoning-board meeting.

And, according to Chris Wells, Santa Fe's All Species shepherd, "It's good for human beings to learn that they're on top of the biotic pyramid, rather than holding it up."

IF YOU'RE GOING TO STRAY FROM THE BEATEN PATH OF Western Civilization, you'll want the good will of those around you. Actually, the major thrust of bioregionalism is that our centralized government is numb to the needs of specific places. As we decentralize, the theory goes, power will flow back to the community level, where it can be wielded with a little finesse.

You and your neighbors will establish your own economic

system, one that keeps money and resources at home, rather than sending them off to distant banks and warehouses. Barter networks will spring up, allowing you to give your handmade furniture to Peter and take your vegetables from Paul with no money changing hands. Instead of growth, growth, growth, the economic goal will be sustainability.

As a community in tune with its ecosystem, you'll be united behind land-use principles. Under our current political system, one group of Washington bureaucrats decides how to use old-growth forests in Oregon, while a different batch decides the fate of an endangered fish in Tennessee.

What better alternative could there be than entrusting the stewardship of a patch of ground to the people who live in it? No one from outside the bioregion will have such a keen sense of the bioregion's life-supporting dynamics. No one from outside will value its resources the same way an inhabitant will — especially if that inhabitant is thinking for all the species.

Though bioregionalists tend to feel that our current government can't be reformed, there is plenty of political work for a fired-up community to do. Many land-use policies are made at home, by local planning boards, zoning boards, and commissions. All these processes depend on public participation.

ONE VERY SIMPLE WAY TO LOCALIZE IS TO WEED "FOREIGN" foods from your diet. If you're a New Yorker eating California rice, you're not only supporting the production of rice in an absurdly unsuitable climate, but also commissioning its transport across 3,000 miles, and missing out on the earthy taste of Long Island potatoes.

Must we eat only local foods — those that Native Americans would have lived on? No. There's room in the bioregional vision for greenhouses, hydrogen-fueled vehicles, and symphony orchestras. The acid test is sustainability. If a food (plant or animal) can be produced without wrecking another species, then *bon appetit*.

Let's be realistic here: Until global warming makes chocolate and avocados suitable to every bioregion, resistance to eating locally could take violent form. But while you're waiting, make the farmer's market, with its fresh, local foods, part of your shopping routine. You might also raise some food of your own. A number of harvested veggies will sprout new, edible leaves if you just give 'em a home in a large pot of rich soil on a sunny windowsill. Root crops are good candidates, including turnips, carrots, and garlic bulbs. Alfalfa sprouts and potted herbs are nearly foolproof, too.

On one hand, bioregionalists tend to be a pretty action-oriented bunch. They put their above-average understanding of natural history to work doing hands-on restoration in their bioregions. But when they come out of the woods and sit down together, they spend hours wrangling over -isms. Charges levelled against the movement, which is blindingly white, include racism, male domination, and perpetuation of gender stereotypes such as Mother Earth and Father Lightning.

The argument goes thus: Our current culture encourages exploitation — of women by men, of workers by corporations, of the Earth by people. The person who exploits the most gets the

Coming Home

In summer we have a big garden.

Maine. "We said, 'Sure!'

Maine Green: Shoot a Developer.

Gathering for 300 people near Augusta, Maine.

try to buy food at places where we know where the money is going. And we try to find out where the

Brunswick



Nobleboro, ME 04555; (207) 729-5033

TONEE HARBERT / Casco Bay Weekly



SETH EASTMAN'S OJIBWA WOMEN HARVESTING RICE, 1850

most stuff. So, in the words of ecofeminist Judith Plant, "We have to put our own house in order. Our relationships with the Earth reflect our relationships with each other."

But this navel-gazing leads to some interesting detours from the ecological path — at NABC IV, the fear arose that if the people of color were permitted to caucus (chew the fat) without white people present, then *that would mean the white people could meet alone, too!* Heavens.

If, on examination, your own culture and history appear embarrassingly unenlightened, resist the urge to ditch them and appropriate someone else's. The challenge is to weave together your own roots with the systems (social and ecological) that sustain you now. As put by Jeffrey Lewis, a black participant in NABC III, "We need to recognize that green values or bioregional values are not something wholly new, or limited to native peoples."

THE NATIVE PEOPLE OF THIS CONTINENT DIDN'T LIVE within the limits of their place because that was the right and honorable thing to do — their bioregional purity was aided by the fact that there wasn't a supermarket for thousands of miles. Imagine our transportation network has crumbled into obscurity (not such a stretch), and look around you. How would you spend your time in order to clothe, shelter, and feed yourself without fouling your own nest?

There's a lot to be learned from the people who lived in your place before you, and the lifestyles they developed specifically for each part of the world. How did your predecessors preserve themselves and their home? This is local knowledge, so you may need to dig deeper than the library shelf. Contributors to your bioregional survival manual might include rural grandparents, and folk-knowledge books like the *Foxfire* series.

However, as you peel back the layers of civilization, beware Joe's Rent-a-Spirit service. Sticking feathers in your hair and banging on a drum is no guarantee of instant and profound spirituality. To the casual observer, some rites of bioregionalism look like a grown-up's game of Indians and Indians.

Nonetheless, a spiritual affinity with your Earth-mates is key. Just as a bioregion is an entity best handled by its inhabitants, so goes it with a soul. If you can't get teary-eyed contemplating the sacrifice of the beings arranged on your dinner plate, don't give up. If you keep your eyes open and your ear to the ground, your home will inform you of the correct order of things.

But get on with it. You'll have trouble caucusing with the bioregionalists until you can smooch a fir tree with a straight face. ☺

For more info on bioregional organizations, books, and newsletters, contact Planet Drum Foundation, P.O.Box 31251, San Francisco (Shasta bioregion), CA 94131; (415) 285-6556.

Your Score:

0 to 4 Unlock your door and go outside.

5 to 8 You know it's fairly firm grasp of the obvious.

9 to 12 You really pay attention.

13 to 20 You know where you're at (and where it's at).

The quiz questions are adapted from bioregional quiz first published in *CoEvolution Quarterly* in 1981. They were compiled by Leonard Cheshire, Jim Dodge, Liane Hartley, and Victoria Sheldene.

Our thanks to Gloucester's Blether Estuary 2002 Ltd. in Coningham, who provided many of the answers from our brought up our embarrasingly low scores.

Gloucester

Where Are You At? A Bioregional Quiz

Q: Where does your garbage go?

A: Most household garbage goes to the landfill in Peabody; Mass. About 11% is brought to the recycling drop-off center. Some folks compost.

Q: How long is the growing season where you live?

A: About 150 days or 5 months (mid-May to mid-Oct.)

Q: Name five grasses in your area. Are any of them native?

A: American beach grass, little bluestem grass, foxtail, salt meadow grass, cord grass. All are native.

Q: Name five resident and five migratory birds in your area.

A: Resident: Crow, blue jay, chick-a-dee, red-tailed hawk, starling. Migratory: Baltimore oriole, robin, red-winged black bird, snowy egret, snowy owl.

Q: What is the land-use history of where you live?

A: Forest, pasture, quarrying, shell fishing, salt-marsh boating, residential.

Q: What primary ecological process influenced the land form where you live?

A: (One point bonus: What's the evidence?) Glacial moraine.

Q: Trace the water you drink from precipitation to tap.

A: Rain → Watershed → Reservoir → Pumping stations → Purification plant → Water mains → House pipes → Tap.

Q: What soil series are you standing on?

A: Hollis-Chapfield (glacial till).

Q: What was the rainfall in your area last year? (Guess within an inch and you get full credit.)

A: 40 inches.

Q: What were the primary subsistence techniques of the indigenous culture in your area?

A: Fishing, farming, and hunting. Native peoples grew corn, squash, and beans.

Q: Name five native edible plants in your region and their season(s) of

Evidence: deposits of large, erratic boulders.

Q: What species have become extinct in your area?

A: Heath hen, Labrador duck, passenger pigeon, great auk.

Q: What are the major plant associations in your region?

A: Northern hardwoods, salt marsh, oak-hickory forest, maple swamp, cattail marsh, sphagnum bog.

Q: What spring wildflowers are consistently among the first to bloom where you live?

A: Marsh marigolds, bluets, Canada thistle, trailing mayflowers. All bloom in April.

Aug.-Sept.
Summer
July-August
August
Year round
April-May

From what direction do winter storms generally come in your region?

SE

Indian cucumber
Glasswort
Blueberries
Blackberries
Seaweed
Cattail

GARBAGE...On Location!

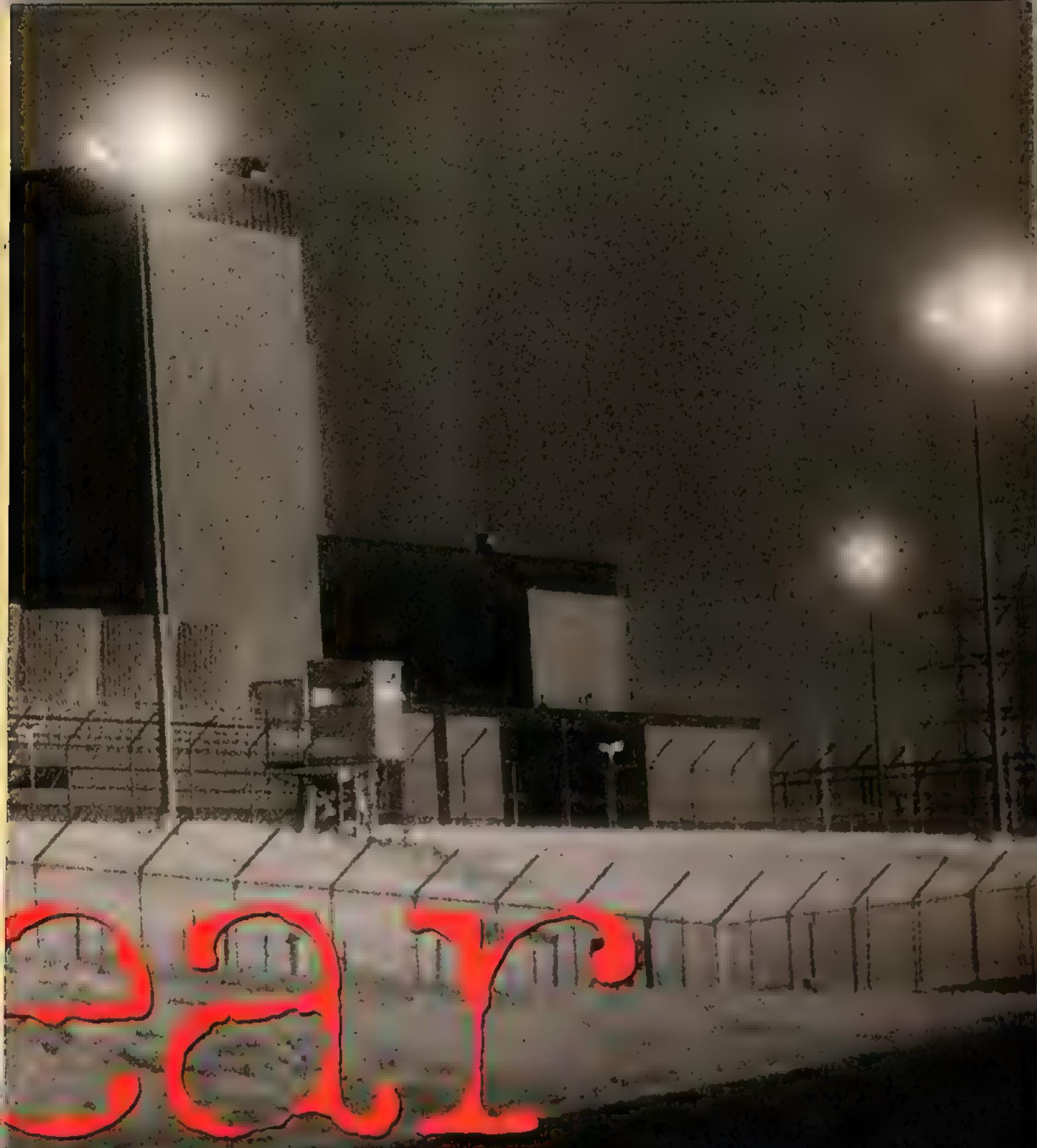
Is it possible there are no state lines, no interstate highways, marked by a street map, or tangible terrain instead of political borders. Yet without the familiar signposts, or maps like this one, makes us feel disoriented. Where am I? Don't panic; everybody has learned to ignore geography in favor of paved roads. (We mark Boston and Gloucester to restore some equilibrium.) You can learn to connect to your place on Earth. Start by finding answers to the quiz questions above — drivers applicable to your particular bioregion.

With a road map, we answer the questions for the bioregion where our office is located: the Gulf of Maine bioregion, stretching from south-central Maine to Boston's South Shore. This road connects us to the section from Ipswich to Plymouth (Massachusetts). Geographically,

NUCLEAR GARBAGE
PART ONE

By BILL BREEN

Disgraceful Nuclear Power Plants



IN PLATTEVILLE, COLORADO, FORT ST.
VRAIN'S NUCLEAR REACTOR IS DEAD

JUST 35 MILES NORTH OF DENVER, THE TOWN OF PLATTEVILLE SITS IN flat, sparsely settled farm country — a part of Colorado the skiers never see. The town is a crossroads: gas stations, a huddle of houses, and a bar where a mounted (and real), two-headed calf gazes down on glassy-eyed patrons. Platteville is the kind of place where folks won't fuss and cuss if a utility builds a nuclear reactor in their backyard, which is exactly what Public Service Co. of Colorado did in 1979. The plant died ten years later. Now workers are removing the highly radioactive spent fuel, and ready-



ing the reactor for a decent burial.

As I drive north out of Platteville along a slab of ice marked Weld County Rd. 19-½, the Fort St. Vrain nuclear power plant looms up: a 220-foot high monolith connected to ribbons of wire slicing across a great blue dome of sky. Pulling up, I cut the car's engine. Silence settles — punctuated by the chirping of sparrows apparently nesting in the ten cooling towers fronting the plant. Fort St. Vrain, it seems, really is dead. Designed to generate up to 330 megawatts of power, enough to light up one-third of Denver, the plant no longer produces enough juice to brighten a 100-watt bulb.

There are compelling arguments for nuclear energy: It represents millions of barrels of oil not consumed and millions of tons of carbon dioxide not spewed into the atmosphere from fossil-fuel plants (or "dirt burners," as they say in the nuke biz). But even pro-nukes concede that getting rid of radioactive waste is the ultimate garbage problem.

Just consider: A reactor's spent fuel, also known as high-level waste, is the most radioactive stuff on the planet, but there's no permanent place to dump it. Then there's the reactor itself, which doesn't live forever. Sooner or later it must be dismantled and its irradiated remains safely interred. Despite our most fervent wishes, there's no such thing as a hazardous-waste gremlin to zap it all away.

IT'S DEADLY RADIOACTIVITY AND LONG LIFE MAKE NUCLEAR GARBAGE UNLIKE ANY OTHER WASTE. AT FORT ST. VRAIN, SPENT FUEL IS MOBBALLED BENEATH CAST-IRON PLUGS (ABOVE) WHICH HONEYCOMB THE DRY-STORAGE FACILITY (OPPOSITE).

Hot Garbage

BACK IN THE 1950S, AS AN EMERGING INDUSTRY GOT JAZZED up over developing nuclear technology commercially, the problem of getting rid of hot garbage got buried. Even when the first commercial reactor was licensed in 1957, nuclear engineers still hadn't devised a disposal solution, notes Scott Saleska of the Institute for Energy and Environmental Research. He quotes Carroll Wilson, the first general manager of the Atomic Energy Commission, as recalling that "nobody got brownie points for caring about nuclear waste."

Thirty-five years later, as an older generation of plants begins to wear out, there emerges another waste problem that's been largely overlooked outside of nuclear circles: decommissioning aged reactors. Decommissioning means removing the highly radioactive spent fuel, scrubbing contaminated tubing and structural surfaces, cutting irradiated steel and concrete into chunks for burial in a suitable spot, and freeing the site for reuse.

"Along with the waste issue, decommissioning has never really been addressed," says Ken Bossong of Public Citizen Critical Mass Energy Project. "The public believed the industry's contention that the technical problems in dealing with waste could be resolved — that the can-do spirit would prevail. Unfortunately, the problem is [now] here, and there are no real solutions."

Virtually everyone in the nuclear industry whom I spoke with insist that decommissioning is low-tech and highly doable. Industry outsiders are skeptical. The longer a plant operates, the more radioactivity builds up inside it, and techniques must be engineered for isolating a reactor's contaminated innards. We can't abandon a nuclear power plant at the end of its life and let hard-hats with jack hammers pound away at it.

Although the nuclear industry has gained some valuable know-how from decommissioning Pennsylvania's Shippingport reactor and a handful of smaller stations, *a large commercial reactor has never been decommissioned*. At 72 megawatts, Shippingport was a lightweight compared to the 1,000-megawatt behemoths that await dismantling. At 330 megawatts, Fort St. Vrain weighs in as a middleweight. By 1998, it should emerge from the rubble as an environmental good guy: a clean burning natural-gas plant with 35 acres of photovoltaic cells for generating an additional 1.4 megawatts of solar power.

Just how many plants are approaching retirement? Like most things nuclear, it depends on whom you ask.

The U.S. Department of Energy, betting that the average reactor will operate for at least 30 years, projects that 67 of the nation's 110 plants will have shut down by 2020. This gives the nuclear industry an extended deadline for funeral preparations. But the environmental group Public Citizen reports the 12 reactors that are now closed had an average life span of just 9.6 years. Do I hear alarm bells going off?

"There are 15 to 20 plants out there that are hovering around the edge of shutting down," says Mr. Bossong, who headed Public Citizen's reactor-by-reactor decommissioning survey in 1990. "Over the next decade, you'll see at least 15 of them close. Then, the decommissioning issue will have to be squarely faced."

Inside the Fort

AFTER UNDERGOING A SECURITY CHECK BY PISTOL-PACKING guards, I enter Fort St. Vrain with Frank Novacheck, the plant's decommissioning program manager. With its maze of pipes and contorted tubing, the place looks like a nightmare version of Rube Goldberg's basement.

The Fort contains the nation's only gas-cooled commercial reactor, which used helium instead of water to cool its core and transfer heat to a generator that boiled water under high pressure. The resulting steam turned the turbines which produced electricity. While the reactor worked well, problems with its support system forced numerous shutdowns and a mounting deficit. When Public Service Co. finally pulled the plug, Fort St. Vrain was the worst-performing plant in the country, operating at less than 15 percent of its electrical capacity. On the upside, the downtime means the reactor built up far less radiation than a typical water-boiling reactor that's been running flat out for years.

In its demise, the Fort is pioneering the dismantling proc-

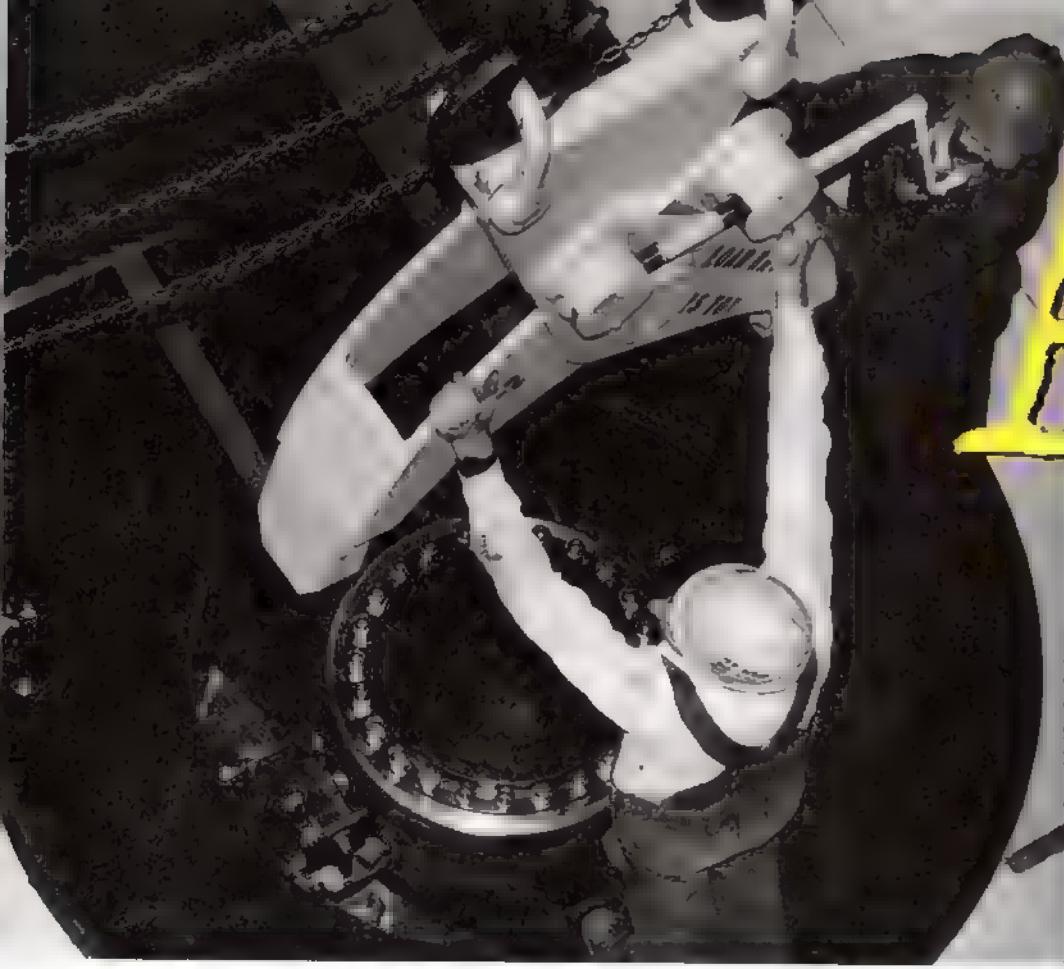
ess: Its reactor vessel will be the first that's ever been chopped up. The massive structure's steel-reinforced walls range from 9 to 15 feet thick. Built for performance and safety, its girth now challenges the engineers who would take it apart.

Starting this summer, after the reactor's highly radioactive spent fuel has been removed, workers will lop off the top of the 107-foot vessel surrounding the reactor and flood it to the brim with 400,000 gallons of water. The water shields workers by smothering air-borne contaminants. Standing on a deck that hangs over the reactor vessel, workers will use plasma arc torches to cut radioactive components and remote-controlled grapples to pull them from the core. They'll also peel away the vessel's innermost layer of contaminated concrete.

Other crews will use diamond-wire saws to slice and dice the concrete vessel into 42-ton chunks. Finally, workers with high-pressure water jets and chemical solvents will scrub additional piping that's been contaminated with a thin layer of radioactivity (called "crud" in the parlance of the biz). Every piece of machinery that comes in direct contact with a contaminated surface must also be decontaminated, or else it too will be tossed on the radioactive waste pile.

Much of the remote-cutting techniques to be used at Fort St. Vrain were developed during the cleanup following Three Mile





WORKERS AT FORT ST. VRAIN READY MACHINERY FOR DELIVERING SIX HIGHLY RADIOACTIVE FUEL ELEMENTS.

Island's rather spectacular closure. "We're not in uncharted waters," says Frank Novacheck. "We're working with proven technology and we're going to make this a success for the industry."

Even the industry's opponents wish them well. After all, nothing warms a no-nuker's heart like cannibalizing a reactor. But before anyone uncorks the champagne, let me tell you a story about the nuking of Nuclear Lake. It'll offer a little insight into the lack of regulatory oversight of decommissioned plants.

Ode on Nuclear Lake

NUCLEAR LAKE IS A 55-ACRE POND SURROUNDED BY A 1,170-acre compound near Pawling, N.Y. An outfit called Gulf United Nuclear Corporation bought the place in 1958 to process enriched uranium into the fuel elements that power a reactor. In 1975 GUNC closed down and "decommissioned" its plant, and the Nuclear Regulatory Commission gave GUNC its rubber-stamp of approval. The property was purchased by the National Park Service, which planned to use it for relocating part of the Appalachian Trail.

The hikers will have to wait. An independent survey team visited the site and discovered radioactive contamination that ranged up to 320 times higher than the NRC's guidelines. It also found 50 unidentified objects on the lake bottom, which "need to be investigated further." Bill Sanders, chief ranger of the Appalachian Trail, reports that the NRC has returned to Nuclear Lake and "is trying to make things right."

I told this story to Dr. Theodore Bessman, research group

reactor's spent fuel is the itself, which doesn't

leader at Oak Ridge National Laboratory. "What does it say about the NRC's ability to oversee decommissioning at a nuclear plant?" I asked.

His reply: "You're comparing apples and oranges. At a fuel-cycle facility you'll have liquid wastes in tanks around the site and solid waste inside. At a nuclear-power plant the radioactive materials are isolated within the containment structure, and they'll all be carted off during decommissioning."

Point taken. But since a large commercial nuclear plant has never been decommissioned, fuel-cycle plants (which process enriched uranium into fuel elements) are seen as the only yardstick for judging the NRC's performance in regulating decommissioning. What's more, Nuclear Lake is not an isolated case. A 1989 study by the General Accounting Office, a Congressional investigative arm, found serious lapses of regulatory oversight at six of the eight fuel-cycle plants it reviewed.

"The NRC gave the Pawling, N.Y., site its OK, and then we go in and find the place isn't safe," says Philip Olson, who led the GAO study. "For some people, that [raises] the question: What is the NRC doing regulating this industry?"

Also troubling is the lack of a federally approved radiation standard for releasing commercial plants for unrestricted use. In other words, just how radiologically "clean" should a decommissioned plant be? Don't ask the EPA. In 1970, the agency was charged with developing a radiation-dose limit for decommissioned plants to protect public health and the environment. It still hasn't come up with a figure, leaving the NRC to deal with the problem. (The NRC applies an exposure-dose level that generally works out to 10 millirems per person per year, which is lower than the radiation emanating from the ground and atmosphere in some parts of the U.S.)

When I called the EPA, even a press officer wondered, "What do our radiation guys do, year after year after year?" The answer: It'll be another one to two years before a federal standard is set.

"The debate centers around the level of radiation you subject people to and the cost that you bring to bear on the utility."

most radioactive stuff on the planet, but there's no permanent place to dump it. Then there's the reactor live forever. Sooner or later it must be dismantled and its irradiated remains safely interred.

says Dr. Allan Richardson, the EPA's chief of radiation guides and criteria. "Those aren't science issues; they're economic issues. The risks of radiation are relatively well agreed upon."

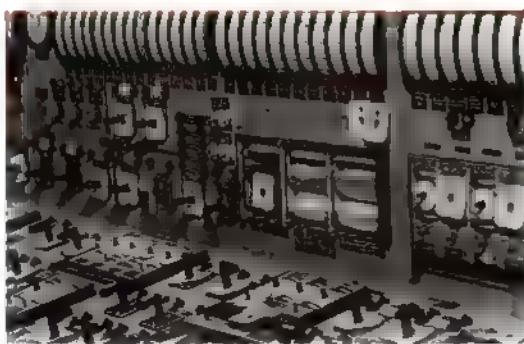
Miscellaneous Radioactive Junk

SOME OF YOU GARBOLISTS ARE PROBABLY WONDERING what happens to the remains of a dismantled plant. Well, about 85 percent of it isn't contaminated, or it's scrubbed clean by workers. Treated as C&D, construction and demolition debris, it's fit for dumping in a regular landfill.

The contaminated material — irradiated steel, concrete, control rods, worker's clothes that can't be cleaned — is called "low-level waste." Tearing down Fort St. Vrain will leave up to 140,000 cubic feet of the stuff. Some of it gets squashed by a Big Foot compactor into six-inch briquettes and crammed into 55-gallon steel drums. All of it is sent packing to Beatty, Nevada's low-level waste site, where it's given a shallow burial.

There are two important points to remember when talking about getting rid of low-level waste.

The first is that its volume doesn't amount to a molehill when compared to the mountains of industrial and domestic trash



which rise across the land. In fact, the stuff's volume isn't nearly as important as its toxicity. Which leads us to the second point: Low-level waste is an Irish stew of contaminated materials. It's defined simply by what it isn't: spent fuel, a.k.a. high-level waste.

"A more appropriate name for low-level waste is 'miscellaneous radioactive junk,'" says Mr. Saleska of the Institute for Energy and Environmental Research.

Radioactivity is like a hangover: The sole sure-fire cure is time. Only the natural decay process diminishes the level of radiation in nuclear waste. With low-level waste, it takes up to 100 years for 97 percent of the radiation to decay to safe levels, according to the GAO. And what of the remaining three percent? It remains harmful for 300 to 500 years or more.

Nearly all of the nation's low-level waste is now shipped to three sites in the hinterlands of Nevada, South Carolina, and Washington. That's all going to change in 1993, when a federal law orders states to take care of their own waste. Some plants will try to buy time and wait for new disposal facilities to become operational by mothballing their reactors for up to 60 years and then dismantling them. In decommissioning circles, it's called SAFSTOR. (These nuke guys love euphemisms.)

Nuclear Reading

YOU COULD DROWN IN ALL THE MOUNDS OF information on nuclear energy. Don't be afraid, dive in! Like it or not, we live in a nuclear world, and the only way to make an informed judgment regarding present and future use is to educate ourselves. Stay alert, though: As with most environmental issues, everyone in the nuclear arena has an agenda that influences how the info is presented.

Both Sides Nuclear Choices: A Citizen's Guide to Nuclear Technology by Richard Wolfson. The MIT Press, 55 Hayward St., Cambridge, MA 02142; (800) 356-0342. Hardcover, \$30.65 ppd. It stresses the connections between all nuclear technologies, preparing you to make your own nuclear choice — even if you lack a scientific background.

Nuclear Power: Both Sides edited by Michio Kaku and Jennifer Trainer. WW Norton, Sales Dept., 500 Fifth Ave., New York, NY 10110; (800) 233-4830. Softcover, \$11.95 ppd. A collection of essays presenting contradictory — and

convincing — points of view on nuclear issues.

Regulatory Agencies Department of Energy Office of Civilian Radioactive Waste Management Information Center, P.O. Box 44375, Washington, DC 20026; (800) 225-6972. Provides brochures, fact-sheets, videos, and technical documents on questions concerning radioactive waste from commercial facilities.

U.S. Nuclear Regulatory Commission, Office of Public Affairs, Washington, DC 20555; (301) 504-2240. The NRC is responsible for licensing and regulating nuclear facilities. This is a massive bureaucracy, and you may get bounced around like a basketball before you find the person that can help you. A must read for decommissioning fanatics is *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (NUREG-0586).

Anti-Nukers Public Citizen, 215 Pennsylvania Ave. SE, Washington DC, 20003; (202) 546-4996. The jewel of the Nader empire, Public Citizen publishes solidly researched papers, has an extensive library, and can refer you to

sources. Their report *Payment Due* (\$10, pre-paid) tallies the decommissioning bill for every reactor in the country, and finds that savings fall far short of projected costs.

Worldwatch Institute 1776 Massachusetts Ave., NW, Washington, DC, 20036; (202) 452-1999. Among the many things it does, Worldwatch puts out hard-hitting, comprehensive studies on different aspects of nuclear energy. Published in 1986, *Decommissioning Nuclear Power's Missing Link* (\$5, pre-paid) is a ground-breaking study, although some of the stats are dated.

Pro-Nukers U.S. Council for Energy Awareness, 1776 I St., NW, Washington, DC 20006-2495; (202) 293-0770. The voice of the nuclear industry, USCEA has a large, friendly, and efficient public-relations office with mountains of statistics and literature.

American Nuclear Society 555 N. Kensington Ave., LaGrange Park, IL 60525; (708) 352-6611. Non-profit membership organization of individuals, utilities, and organizations. They publish the definitive trade mag, *Nuclear News*.

—Ethan Seidman

Only the natural decay process diminishes the level of radiation in nuclear waste. With cent of the radiation to decay to safe levels. The remaining three percent re

While it's unclear just how many will opt for the mothballs, it'll take only a few dismantled reactors to make the nuclear waste stream pile up, leaving us with a volume problem that's for real. Cynthia Pollock of the Worldwatch Institute estimates that in the U.S., the contaminated debris from one large, dismantled nuclear reactor will equal one-fourth of all the low-level wastes disposed annually.

Getting Close to the Hot Stuff

WEAR THIS SELF-READING DOSIMETER ON YOUR UPPER BODY. It'll keep track of your exposure as you go through the facility," instructs Ted Borst, radiation protection manager at Fort St. Vrain. In the unlikely event that you pick up some contamination, it can be removed with tape or soap and water. We've never had an incident at Fort St. Vrain where someone's had to wash their entire body, but we've got a shower if the need arises."

"Is it a cold shower?" I ask.
"You bet it is."

Tape and soapy water as a radiation remedy hardly inspire confidence. Even so, I'm about to enter the Independent Spent Fuel Storage Installation (ISFSI), the place where Fort St. Vrain's dangerously radioactive spent fuel is temporarily housed. Just one-quarter mile from the plant, it's a massive fortress of concrete packed with steel tendons, built to withstand a direct hit from a 747.

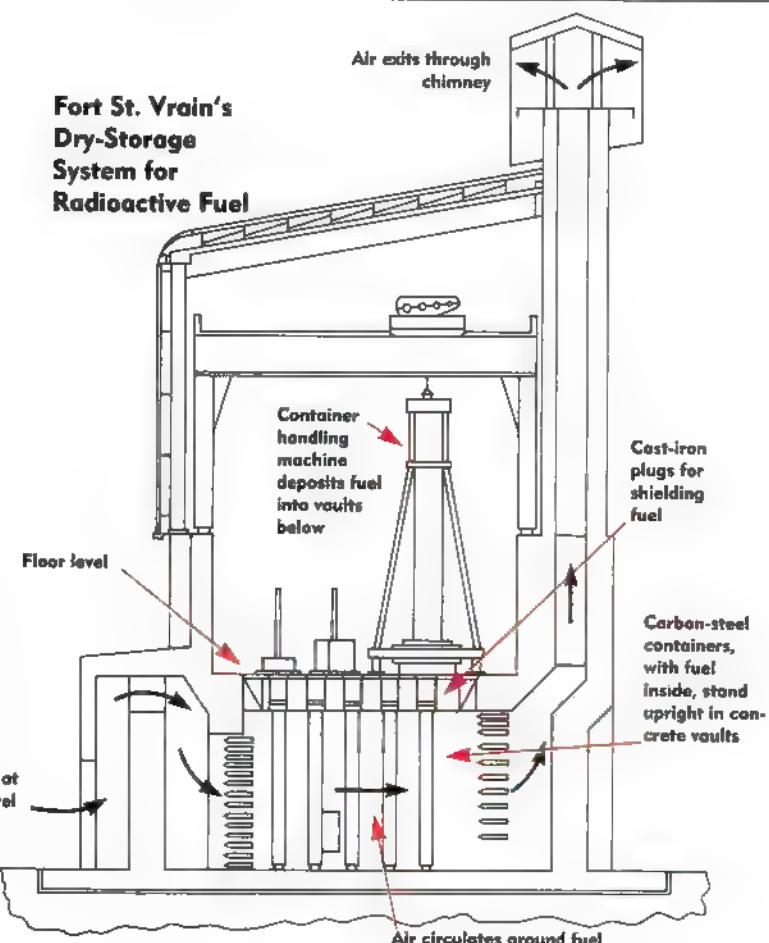
For Fort St. Vrain, the ISFSI is a short-term solution (up to 40 years) to the big-time problem of where to dump spent fuel — permanently. The federal Department of Energy has slated Yucca Mountain, Nev., as its sole candidate for permanently disposing high-level waste. Even if studies conclude that Yucca makes a safe repository, it won't open for business until 2010 at the earliest. Meanwhile, nuclear plants must store their spent fuel on site, often in water-filled holding ponds.

This past December, workers at Fort St. Vrain began using a small crane to geeeeently pluck six fuel elements from the reactor's core. The spent fuel, sealed in a carbon-steel canister, is placed inside a shipping cask lined with depleted uranium (it's used for shielding, and it's better than lead). The load gets trucked over the short-haul to the ISFSI, where it's remotely lifted into a 55-ton container-handling machine and geeeeently deposited into a con-

Keeping Spent Fuel Cool

WHILE THE EXPERTS PONDER how to permanently dispose of irradiated spent fuel, nuclear plant operators must do something with the stuff. The typical (and temporary) solution: store it in large pools of cooling water near nuclear reactors. At Fort St. Vrain, however, radioactive fuel is kept high and dry in the massive Independent Spent Fuel Storage Installation shown here.

Inside the ISFSI, the hot stuff stays cool by natural air convection. Air enters at ground level, circulates around all 247 storage containers, and exits through an 80-foot tall chimney. Even anti-nukes agree that dry storage is safer than pools, which use electric pumps to circulate water. Unlike those with pumps and other mechanical devices, passive cooling systems are low-maintenance operations.



low-level waste, it takes up to 100 years for 97 per-
mains harmful for 300 to 500 years or more.

crete vault topped with a three-foot thick, cast-iron plug (see diagram, p. 46). The process is called defueling, and it's repeated every 12 hours until all 1,482 fuel elements are put to bed. Defueling, then, is the first step in decommissioning.

When the fuel was loaded into the reactor's core in 1989, it was barely radioactive, and could be handled by workers wearing gloves. Radioactivity results from the process of making power. When a chain reaction is induced, the uranium atoms are split to give off energy, and the atoms that result are internally unstable, emitting subatomic particles and energy waves called radiation.

The reactor is basically a thermonuclear furnace, and the fuel is exposed to extreme heat and radiation. Fresh from the core, spent fuel is nasty stuff. How nasty? Technicians at Fort St. Vrain joke that it's "self-protecting," meaning you'd die before you could get close enough to steal it.

Inside the ISFSI, whistles and buzzers echo as a team of workers ready machinery for the next spent-fuel delivery. Standing on the "charge face," where tremendous levels of radioactivity are trapped directly below, I'm struck by what I don't see: None of us are wearing respirators or protective clothing. Apparently, the amount of radiation in the work area is lower than the amount of radiation emanating naturally from Platteville's almost-mile-high atmosphere.

Even so, there is radiation in the place. Jeff Vassett, a health physics technician, periodically hoists a Plexiglas shield to "knock down a little beta shine" from a shipping cask as workers cover it with a steel plug.

Workers here talk matter-of-factly about the number of rems that they've got "in the bank." (A rem is a measure of radiation's effect on the human body.) By law, a nuclear worker can be exposed to no more than three rems every three months, and cannot exceed a yearly dose of 12 rems per year. A single chest X-ray will leave you with about .06 rems. Compared with other commercial plants, workers here call Fort St. Vrain a "low-dose operation." It's been pretty stingy with Radiation Protection

Manager Ted Borst, depositing just a single rem in his body bank.

Walking out of the ISFSI, both my self-reading dosimeter and a "frisker" probe read zero. I'm relieved, but not entirely reassured. Later that night I drop by Jeff Vassett's house in Platteville. We talk about radioactivity and working in nuclear plants.

Jeff strongly backs nuclear energy. Like many workers at Fort St. Vrain, he believes that, had its technical problems been solved, it could have generated a lot of energy and set a standard for the industry.

"Nuclear plants have put a lot of meals on a lot of tables," he says. "It's a tradeoff. You're risking your health but you're making hazardous-duty pay."



BACKED BY FORT ST. VRAIN'S STEAM-TURBINE GENERATOR, 55-GALLON DRUMS (CALLED "DUMMIES")
AWAIT LOADING INTO THE REACTOR'S CORE, WHERE THEY'LL REPLACE SPENT FUEL.

To a lesser degree, all of us accept that same tradeoff in the name of keeping our VCRs playing and our hair dryers humming. That doesn't prevent some of us from being scared of technology, and our fear jumps exponentially when nuclear energy is brought into the equation. Talk nuclear with Mr. and Mrs. Jones, and they're thinking meltdowns and mutations. The nuclear-waste issue puts *nimbyism* into a whole new light.

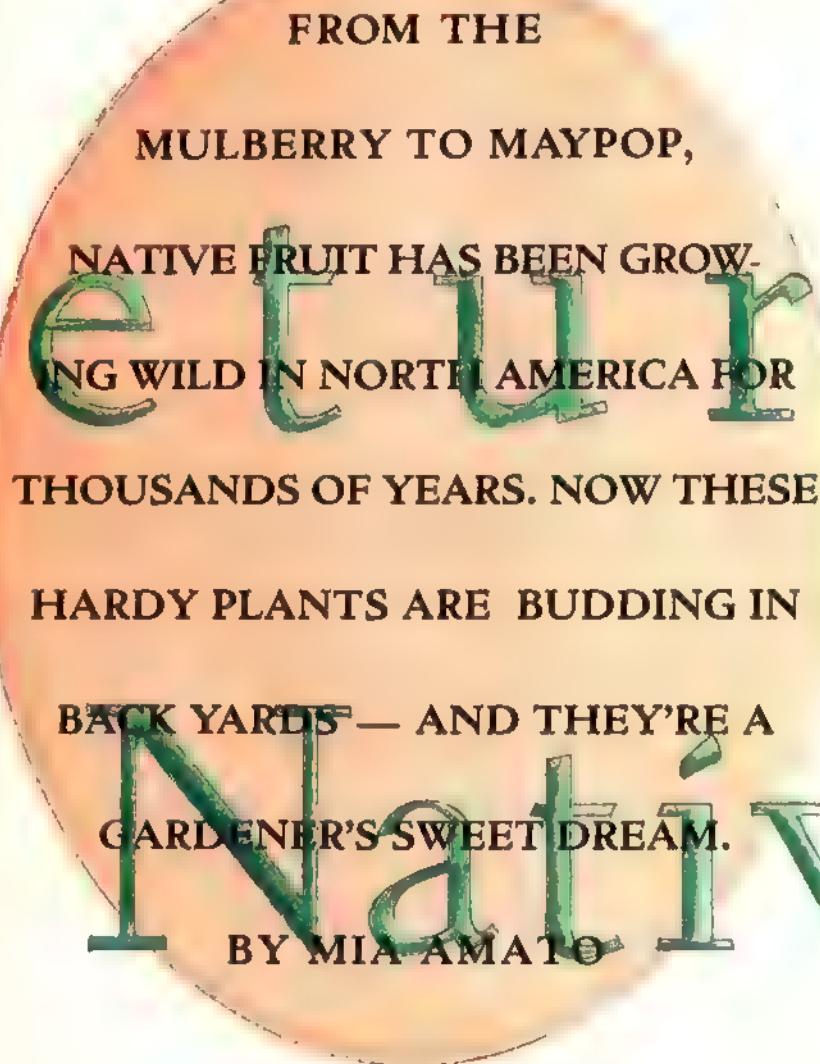
Even so, existing nuclear waste will have to go somewhere. Eventually, all of the reactors must come down. Long (very long) after the last reactor has pumped its last bit of juice, the nuclear waste stream will still be flowing.

Look for an article on solutions for getting rid of nuclear waste in the next issue of GARBAGE.

The

Return

OF Native



ILLUSTRATIONS BY DUGALD STERMER

Fruit

YOU'RE SITTING IN YOUR KITCHEN, SPOON IN HAND. IN FRONT of you, halved, is an oval-shaped fruit. You scoop out the yellow-streaked pulp and put it in your mouth. The texture is akin to very ripe banana — no, more like custard pie. The flavor is like mango, with a hint of pineapple, honeysweet and delicious.

You could have just picked that fruit off a tree in your own backyard. A tree that never needs spraying with chemicals, because its bark contains a natural insecticide. The tree is genetically programmed to be self-pruning, and it's perfectly adapted to your local climate, so it doesn't require extra watering — or any fertilizer.

Asimina triloba is a broad-leaved, native American tree that bears clusters of delicious fruits. Call it the pawpaw. It's one of several hardy wild plants that are finding their way into American gardens, thanks to the work of a small group of dedicated fruit hobbyists. Other native plants that are beginning to bear fruit in organic gardens are the persimmon, beach plum, prickly pear, mulberry, huckleberry, and the maypop — a North American relative of the passion fruit.

The first Europeans to explore the North American continent avidly sought out food plants which were eaten by indigenous people. Some of their discoveries, such as corn, squash, and potato, have gone on to become food staples worldwide. But many native fruits were all but ignored in favor of European introductions such as the apple and pear.

Now, interest in organic gardening and edible landscaping has fueled what Lee Reich, author of *Uncommon Fruits Worthy of Attention*, views as a boom in native-fruit cultivation. "It's difficult to grow apples in my area without spraying, and even then you have to know how to use the right spray at the right time," says Mr. Reich, who gardens in Poughkeepsie, New York. "A lot of native fruits can be grown without any chemicals and with almost no effort."

You don't have to tramp through the back country to find native species. Specialty nurseries promote and sell native edibles

like huckleberry, which makes a fruitful hedge for shady gardens; and wintergreen, an evergreen ground cover whose red berries are a flavor ingredient in chewing gum.

"Many [natives] have been planted for years in gardens, simply for their flowers," says Mr. Reich. Now folks are finally realizing that they can eat them.

After centuries of neglect, the potential for gardening with wild fruit was formally recognized in 1967, with the founding of a group which called itself the

North American Fruit Explorers. NAFFEX claims about 3,000 members. Some are

pomologists, professional fruit scientists whose hobby is searching woods and meadows for wild plants bearing tasty fruit, but most are amateur plant breeders and home gardeners.

They use the mail to exchange planting tips and taste-test data, plus seeds and stock plants.

Anyone who can come up with the \$11 membership fee can join in the fun. For John Bunker of Waterville, Maine, being a Fruit Explorer means teaching his children the joys of nibbling partridge berry and choke-cherry while they forage for wild mushrooms. "People should be less concerned with what plants they can introduce into their landscape," he says, "and concentrate more on [the wild] plants that may already be in their yards or nearby woods."

Most of the major breakthroughs in wild-fruit cultivation have been made by amateurs. It took 81-year-old Corwin Davis of Michigan, for example, to solve the riddle of pawpaw pollination. As Michigan farmer Lee Taylor tells the story, Mr. Davis staked out a pawpaw patch on his farm, sat in his pickup truck for a day and a night, and turned on his headlights every hour to try to catch the night-flying moth that supposedly pollinated the pawpaw. He discovered that the real pollinators were carrion flies.

"What he's doing now is getting buckets of guts from the slaughterhouse and hanging them high in [pawpaw] trees to attract flies," laughs Lee Taylor. "He's getting excellent pollination



and vastly improved fruit set." Mr. Taylor and his wife Jane have been working with Corwin Davis on a pawpaw project for the University of Michigan, where they're growing fruits that weigh more than a pound apiece (nearly three times the pawpaw's normal size).

"Fruit exploring" is one way that the average gardener can make a real impact on national agriculture. There's still the possibility of finding a superior plant in the wild, one that can be propagated by grafting cuttings to fill an orchard with productive trees. And there's always the chance an amateur may come up with a useful hybrid cross.

"Most universities don't have the luxury to devote 20 years to the development of a new fruit hybrid," says Neal Peterson, who started the Washington, D.C.-based PawPaw Foundation in 1988. "That's where the amateurs come in. They have the patience required for these lifelong projects."

Groups like NAFEX and the PawPaw Foundation now offer a way to preserve an individual's research. They're also passing on the "hand skills" required for rescuing and raising native fruits, skills like budding, grafting, and coaxing hardwood cuttings to root and multiply.

Some organic gardeners view the budding interest in wild plants as an opportunity to wrest fruit development away from the influence of agribusiness, which has brought us square tomatoes, large but tasteless strawberries, and mealy, artificially-ripened apples; plus fruits that cannot grow well without chemical fertilizers, growth stimulants, and pesticides.

"A tree in the wild has to protect itself against diseases and insects because there's no one in the woods to spray it with a chemical," says Katherine Pyle of the California Rare Fruit Growers. She adds that even when cultivated, "these wild plants keep the traits we want them to have, like natural disease resistance and, of course, good flavor."

Growing native fruit requires little more than planting the seed and leaving it alone. What follows is a native-fruit sampler

that offers at least one species that you can cultivate in your backyard or your back forty.

NORTH: American Persimmon (*Diospyros virginiana*)

RANGE: New England to Texas

THE JAPANESE PERSIMMON (D. KAKI) IS NOW FARMED COMMERCIALLY in California, largely because an increase in Asian immigrants to the U.S. has created a market for the fruit. The American version, hardy enough to survive winter temperatures of minus 25°F., could become a popular export crop that's farmed in northern states.

LANDSCAPE USE: With broad, spreading branches, the American persimmon grows to 50 feet, and sports brilliant red or orange autumn-leaf color. The tree's three-inch golden globes of fruit hang onto naked branches well into December. It's one of the most striking winter accent plants a garden can claim.

CULTIVATION: John English of NAFEX believes it's best to start native persimmons from seed. In his experience, trees bought bare-root or grown in containers fail to thrive, since the root system is fragile and does not like to be disturbed. Persimmons are not picky about soil type. A seed that's taken from a fruit, if kept moist (stored in a bag and refrigerated) may be planted an inch deep in the fall or spring.

"Just put the seed where you want it grow," says John English. "You could get fruit in just four or five years. That is, if you've got at least one female tree."

Like holly, persimmons grow as male or female trees. Females are distinguished by their single flowers (the male flowers grow in clusters). If you're stuck with a male, don't worry. Female branches can be easily grafted onto a male tree. Mr. English recommends using a whip-and-tongue graft to add the scion (a new branch tip) to a sapling when it's late in the tree's dormant period ("about May in the Midwest"). Grafting techniques are described in *Uncommon Fruits* and the NAFEX Handbook. (See Useful Books, p. 53.)



Persimmons have two known pests, the persimmon borer and the persimmon girdler, which attack the trunks of wild trees. They won't pose a problem if there are just a few native trees around your garden. Scale insects that appear on leaves or stems can be controlled by spraying them with dormant oil. That's a horticultural oil, easy to find in garden centers, which is sprayed on trees after leaf fall to smother insect eggs that overwinter on trunks and branches.

A ten-year-old tree may produce 50 to 100 pounds of fruit in a good year. Wild American persimmons are smaller than Japanese persimmons, and tend to be seedier. Fully ripe fruits, luscious and pudding like, are soft and nearly bursting through the skin. Taste is subjective, of course, and wild fruits vary greatly in flavor.

SELECTION: As you might expect, attempts are underway to create a superior hybrid by combining the large size and sweetness of Japanese persimmon with the cold-tolerance of American varieties.

Meanwhile, seeds and scion-wood of superior native trees are flowing through the U.S. mails, passed around by NAFEX members, other interested gardeners, and some commercial nurseries. "Meader," "Florence," and "Early Golden" are commonly found in mail-order catalogs. Mr. English reports that even these reliable selections perform unevenly in different parts of the country, probably because of weather differences.

SOURCES: Edible Landscaping Nursery, Route 2, Box 77, Afton, VA 22920; (800) 524-4156.
Raintree Nursery, 391 Butts Road, Morton, WA 98356; (206) 496-6400.

SOUTH: Muscadine Grape (*Vitis rotundifolia*)

RANGE: Southern U.S., north to Delaware, west to Kansas

TWO SPECIES OF NORTH AMERICAN WILD GRAPE HAVE ALREADY GONE on to plant fame. *Vitis lambrusca*, from the East Coast, is the

ancestor of the "Concord" grape. Early in this century, rootstocks of *Vitis californica* were exported to France to save the country's vineyards from phylloxera, a disease which attacks grape plants. Now, research is concentrating on the southern muscadine, *Vitis rotundifolia*, sometimes called scuppernong in what may be a corruption of an Indian name.

Marvin Lewis III heads the muscadine study group for NAFEX. A branch librarian in Logansport, Louisiana, he grows about 45 different varieties of the southern grape in his backyard. Here are his tips on muscadines:

LANDSCAPE USE: In a single year, this fast-growing vine can sprout from 10 to 25 feet across a trellis or fence.

Watch out or it will swallow your porch!

Once-a-year pruning is required to keep the vines in check.

Climate presents the only limitation on growing muscadines, as they prefer warm temperatures and high humidity. They can't survive winter temperatures colder than zero F. Even so, Mr. Lewis reports that amateur growers in northern California and Oregon have had some success.

CULTIVATION:

"Muscadines are among the easiest home fruits to grow in the South," says Mr. Lewis. "You rarely ever have to use a chemical spray. They are resistant to most grape diseases, including rots, despite the high humidity we have here." If an occasional pest called the grape moth shows up, spray the vines with an insecticidal soap.

Vines are grown from rooted cuttings planted in the spring. Plant them so the roots are just below the soil line, and water as you would any garden plant. Keep vines under control by pruning them hard in late autumn. Only the newer growth bears fruit, so if you want grapes, prune every year. Don't be alarmed if the stems "bleed" when cut — that's normal.

SELECTION: Before they drop from the vine, truly wild grapes are so acidic "the taste will make your teeth sharp," says Mr. Lewis. (When they're ripe, the flavor of muscadines is uniquely foxy, tart but sweet.) He recommends reliable cultivars like "Fry," "Higgins," "Sweet Jenny," "Welder," and "Black



Beauty." The sole seedless muscadine is "Seedless Fry." SOURCES: Ison's Nursery, Route 1, Box 191, Brooks, GA 30205; (404) 599-6970. The Fig Tree Nursery, P.O. Box 124, Gulf Hammock, FL 32639; (904) 486-2930.

EAST: Pawpaw (*Asimina triloba*)

RANGE: Nebraska and Michigan to Texas and Florida, east to New York State

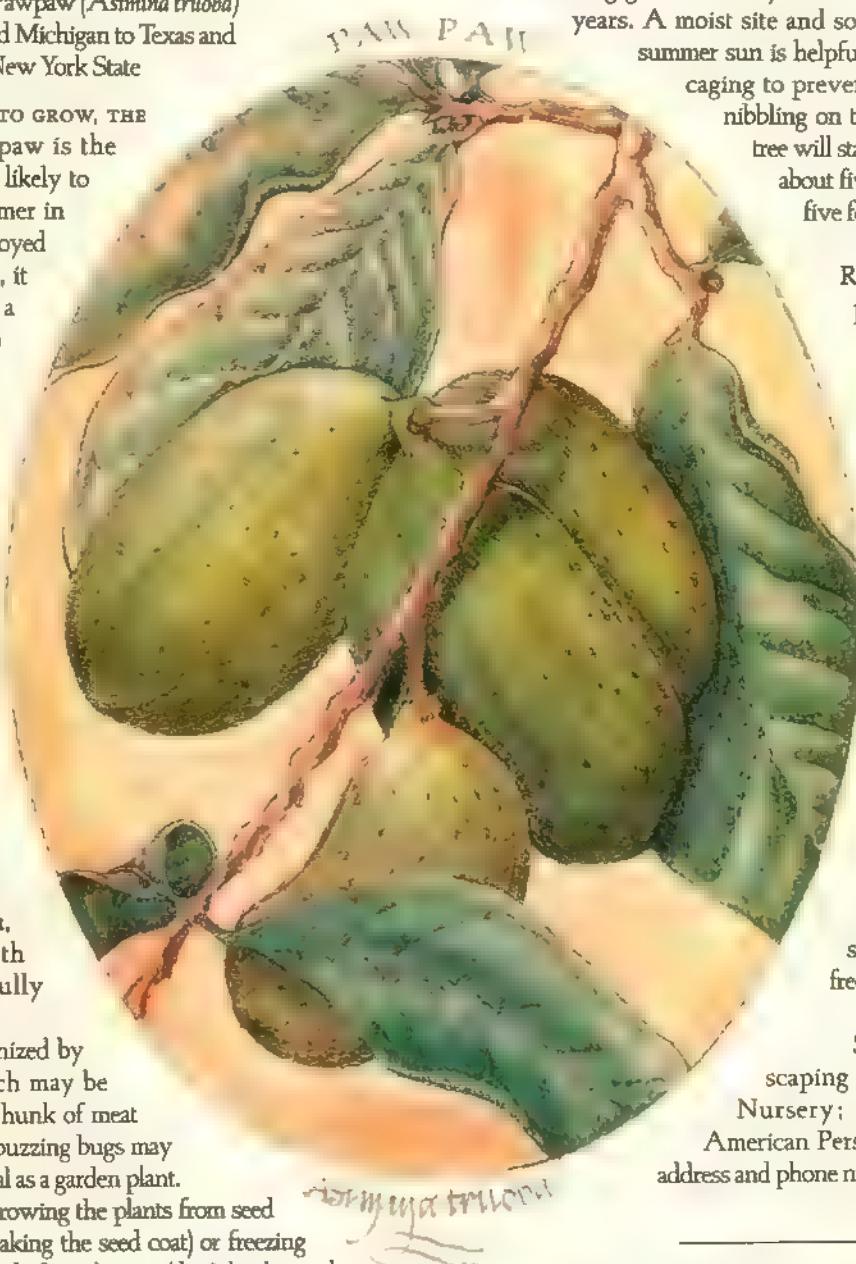
BECAUSE IT'S SO EASY TO GROW, THE tropical-tasting pawpaw is the native fruit that's most likely to succeed as the newcomer in your home garden. Enjoyed by Native Americans, it was also considered a treat by pioneers who dubbed it "Arkansas banana" and "poor-man's banana."

LANDSCAPE USE: Pawpaw grows from 10 to 30 feet tall, spreading outward into a shrubby thicket. (The plant may be trained to grow from a single stem.) Its leaves are broad and its grey bark contains an insect-repelling chemical. Oval fruits grow in clusters; like a banana, they turn yellow with brown spots when fully ripe.

The tree is pollinized by carrion insects (which may be attracted by hanging a hunk of meat nearby). For some, the buzzing bugs may dim the pawpaw's appeal as a garden plant.

CULTIVATION: Growing the plants from seed requires stratifying (breaking the seed coat) or freezing seeds for several months before planting (don't let the seed dry out during germination). Or, try the method Jane Taylor learned from Corwin Davis: "Just squish the entire fruit tight into the ground, stomp it in, then walk off and leave it," she advises. "I guarantee you, if you plant it this winter you'll see a seedling by Father's Day."

Rooted seedlings available by mail-order are another option. Ray Jones of Santa Cruz, California, cautions buyers to beware of nurseries which sell root cuttings from established trees. They rarely survive when transplanted because the roots are very brittle.



"The better nurseries are shipping seedlings in something called a long pot, a four-inch-wide pot that's elongated to accommodate the taproot," Mr. Jones explains. He recommends transplanting potted seedlings at the very end of the dormant period, usually late spring. That gives damaged hair roots a chance to heal.

Seedling growth is very slow for the first two or three years. A moist site and some shade from glaring summer sun is helpful at this stage, as is wire caging to prevent rabbits or deer from nibbling on tender bark. A pawpaw tree will start to bear fruit when it is about five years old (it'll be about five feet tall).

SELECTION: Remember that the pawpaw is a wild fruit, so its flavor and size depend on the individual tree. Named varieties from branch grafts and seeds taken from superior wild trees include "Davis," "Fairchild," "Taylor 1," "Taylor 2," "Rebecca's Gold," and "Sunflower." Many of these are self-fertile, but two or more are recommended for good yields. The fruit can be eaten fresh or baked. It has a short shelf-life when ripe, but freezes well.

SOURCES: Edible Landscaping Nursery and Raintree Nursery; see Sources under American Persimmon, p. 51, for each address and phone number.

WEST: Prickly Pear (*Opuntia humifusa*, *Opuntia Ficus-indica*)

RANGE: Warm Southwest, East Coast

TWO EDIBLE CACTI SHARE PRICKLY PEAR'S NAME: *Opuntia humifusa* is a creeping variety found on the East Coast; *Opuntia Ficus-indica* is a tall, upright, nearly spineless cactus found in the Southwest. (It's also called Indian fig or tuna.) In winter, both develop wrinkly yellow flowers and red-purple fruits.

Kathrine Pyle of Berkeley, California, is a veteran grower of the Western prickly pear, and she points out that the fruit and

the paddle-like leaves are edible (once you've peeled off the skin). "You need to take a vegetable peeler and gouge out the little eyes, as you'd remove the eye of a potato," she explains.

Steve Breyer of the Tripple Brook Farm in Massachusetts calls the Eastern prickly pear a "passable-tasting fruit." Watch out before you bite into one — it's got tiny, hairlike needles that itch like crazy if they detach into your skin.

LANDSCAPE USE: Both plants grow where few plants will. Western O. *Ficus-indica*, which grows from 10 to 18 feet high, has long been used as a landscape plant in California. Ideal for hot, dry locations and soils that are poor in organic matter, it's often planted near a wall or house foundation.

Eastern O. *humifusa* is a six-inch-high, spreading plant that grows wild on beachfront ranging from Cape Cod to Florida. It thrives in dry, sandy soils, so it's perfect for seaside gardens. Because of its spines, Tripple Brook Farm sells it as an edible ground cover that doubles as a barrier plant. "In a cold climate like ours," says Mr. Breyer, "any fruit that can be picked fresh all winter is quite novel."

CULTIVATION: "If you've ever seen a bunch of prickly pear in the wild, you know the pads fall off naturally, and root where they fall," says Kathrine Pyle. "To start your own, all you have to do is break off a pad from a cactus that has sweet fruit. If you find a pad with a flower on it, you could have fruit within the year."

Ms. Pyle suggests standing the pad, cut-side down, in a flowerpot, then covering its lower third with sandy, well drained potting soil. The pad should root in a month or so, and you can transplant at any time of the year. After that, little care is required. Ripe fruits are yellow or red, and soft. The slushy, reddish pulp has a refreshing taste, similar to watermelon.

SELECTION: There aren't any named cultivars for Eastern prickly pear. The Western cactus, "Burbank Spineless," is cultivated commercially. You can find them in gourmet produce markets and Latin American groceries.

SOURCES: Neon Palm Nursery, 1560 Sebastopol Road, Santa Rosa, CA 95407; (707) 578-7467.
Tripple Brook Farm, 37 Middle Road, Southampton, MA 01073; (413) 527-4626.

ORGANIZATIONS

NORTH AMERICAN FRUIT EXPLORERS (NAFEX)

Route 1, Box 94, Chapin, IL 62628;
Membership: (217) 245-7589.

DUES: \$11/year, includes NAFEX Handbook and quarterly issues of *Pomona*.

This networking group supplies the most up-to-date info on rare fruits, plus sources for seeds and plants.

CALIFORNIA RARE FRUIT GROWERS

c/o Fullerton Arboretum, California State University, Fullerton, CA 92634; (619) 442-7395.
DUES: \$16/year; \$25/year for residents of Canada and Mexico; includes quarterly issues of *The Fruit Gardener*.

Similar to NAFEX, it concentrates on subtropical fruits grown everywhere.

THE PAWPAW FOUNDATION

PO Box 23467, Washington, DC 20026; (202) 289-6671.

Information clearinghouse for pawpaw research. Pamphlets available.

NEW YORK STATE AGRICULTURAL EXPERIMENT STATION

Publications Dept., Building 7, Research Park, Cornell University, Ithaca, NY 14853; (607) 255-4080.

A large scientific research institution, call them for specific questions on growing native and other fruit. They will send you pamphlets and a list of their research publications.

THE MASSACHUSETTS HORTICULTURAL SOCIETY

300 Massachusetts Ave., Boston, MA 02115; (617) 255-2080.

Publishes *Horticulture* and *Leaflet* magazines. Basic membership: \$45. The granddaddy of state horticultural societies, the MHS is an authority on horticulture in general, including growing native fruit.

Why Pacific Gas & Electric Isn't Building Any More Nuclear Power

Plants • By Art Kleiner

To an ex-Northern Californian like myself, the most startling thing about Pacific Gas & Electric — the formerly despised electric power utility, and progenitor of Diablo Canyon (a nuclear plant famous for being built near an earthquake fault) — is how quickly it has become trusted by its former enemies. I recently had dinner with Tim Redmond, an outspoken political columnist at the weekly San Francisco Bay Guardian, which for 25 years has hounded PG&E about its municipal misdeeds. "The company may have been forced into doing the right thing," Tim said. "But I think they have actually gotten Amory Lovins' message."

THE END OF THE

PHOTOGRAPHY BY DAVID PETERSON



PG&E buys power from small operations such as this wind farm in Northern California's Altamont Pass.

OFFICIAL FUTURE



MORY LOVINS, THE ALTERNATIVE energy pioneer, also lauded PG&E recently, at the recent EcoTech conference (on environment and technology) in Monterey. He is working with the utility on a research project to stretch energy conservation capabilities. This is one of about 40 separate PG&E "demand-side management" projects, which they've pledged will make up 75% of their new power needs: by reworking the wasteful aspects of their grid, subsidizing energy-efficient appliance purchases, and helping builders redesign buildings. For the rest, they're using small-scale solar/wind/turbine generators, and thus

eliminating the need for any new large-scale plants — nuclear or otherwise. Hence the praise I heard, from a variety of conservation-minded San Franciscans, culminating perhaps in an interview with Ralph Cavanaugh.

Cavanaugh, whose last name rhymes with "cabana," is the Natural Resources Defense Council lawyer who, in the early 1980s, sued PG&E for trying to shift its Diablo Canyon costs onto rate payers — but who, more recently, worked closely with PG&E to help design its new program. That process began in 1989, through a coalition of fifteen groups which had rarely agreed before on anything. The "California Collaborative" included not just utilities and environmental groups, but ratepayer and community-action advocates as well (known for their fierce battles to keep rates down, especially for low-income customers). Together, they agreed that utilities would push conservation, return something like 85% of the savings to their customers, and keep the remaining 15% for themselves. In part because they had a capable, Baby-Boom-aged manager named John Fox as their representative, PG&E did not just grudgingly follow along, but moved into a leadership position in the talks. Now, only a year later, old critics like Cavanaugh are taking the shift at PG&E for granted — and thinking about how it will eventually play out in the rest of the country.

"This is the most fundamental shift," said Cavanaugh (who is known for his torrentially fast speaking manner), "in electric utility rules since Edison. We will no longer tie the profits of this industry to how much electricity it can sell, but to persuading people to use less electricity. It's a bold step and I credit PG&E for taking it." I had first heard about PG&E's changed attitudes last year, while freelance editing a book called

The Art of The Long View (Doubleday, 1991). The author, Peter Schwartz, is president of a Bay Area strategic planning firm called the Global Business Network. PG&E asked them, during the Collaborative meetings, to spin scenarios — images of the future that would help PG&E's dozen top executives investigate their own sense of this change. Over the years, they realized, they had evolved an unspoken set of goals, which they now dubbed "the Official Future": People would move to California, buy ever-more-complex gadgets, insist on more air conditioning, and use power in huge quantities. A utility could only cope, it seemed, through massive new plants. Nukes. Hydropower dams. Heavy-duty wiring grids. These had to be planned years ahead of time, cycling borrowed money continuously from bank to construction firm, back from customers to the bank again.

But (as many PG&E employees already suspected), the Official Future was out of sync with reality. Diablo Canyon, budgeted at \$500 million, had eventually cost \$5.3 billion — thanks to retrofits after Three Mile Island, and original design blunders. This overrun shell-shocked the company. They finally got government approval in 1985 to operate the plant, eventually agreeing (under State pressure) to recover Diablo's costs only from Diablo power. In effect, this meant they could

Energy efficiency was
the only course of
action that would be
profitable under all
possible futures.

take profits only if it ran without mishap; today, it's one of the least troublesome nuclear plants in existence. More importantly, Schwartz' group, by discussing such immutable factors as demographics and technology improvements, discovered that however the future turned out, it would include some aspects of a "Green 1990s" — in which we citizens and employees demanded more energy savings and less pollution. Less harmoniously, there would also be elements of a "Decade of Disorder":

Ultimately, PG&E's leaders realized that if they persisted with the Official Future, they'd cope with neither the Green '90s nor Disorder effectively. Debating the safety of nuclear power, and the storage of hazardous waste, was not even necessary to influence the decision; energy efficiency was the only course of action that would be profitable under all possible futures. PG&E began offering subsidies and rebates to



consumers who bought energy-saving refrigerators; paying builders and remodelers, for instance, to install better air conditioning ducts. All this made the outside world a compatriot instead of an enemy. Moreover, it sparked a renaissance within the company: John Fox, now the director of the project, began getting resumes from employees who said this was why they had joined PG&E in the first place.

"When you set new goals," said Fox, "it becomes a great

stimulus for creativity. You get all kinds of spillover benefits. We learned that customers really like these programs, whether they participate or not. For industrial customers, efficiency is a tool for restoring their economic viability. And we started questioning: Can we also save distribution costs? Can we downsize transformers? Can we put in smaller cable?" In one rapidly growing Sacramento-river town (Antioch), PG&E has a pilot efficiency project which they hope will eliminate the need for a new substation. Another set of projects involves learning how to "sell" energy efficiency to the many Californian subcultures (San Francisco schools teach English to natives of 96 different languages). That, in turn, means PG&E is recruiting a much more diverse group of executives than it ever has before.

And at least one high-level PG&E executive has enthused about the fact that eventually, his company will probably produce no power at all — but broker that power from thousands of smaller-scale producers (including photovoltaic- and wind-based power systems) to millions of customers. That future could come to pass anywhere — and if so, no new coal or nuclear plants would ever be needed, no matter how big the population grew.

There are still skeptics amidst the enthusiasts; they whisper that the change of heart is fragile. What if the savings from energy efficiency don't emerge as promised? Or, as Ralph Cavanaugh points out, what if the Internal Revenue Service keeps its current plan to tax PG&E's energy-efficiency rebates as income — adding a huge disincentive to the mix? On the other hand, similar tales are coming in from Southern California, Washington State, New England, Wisconsin, North Carolina,

At "The Geysers" (actually fumaroles) north of San Francisco, PG&E harnessed an underground geothermal cauldron that produces "natural steam" to work turbine-generators and create electricity, and probably more by the time you read this. In each case, the Official Future has turned out to be a roadblock: Progress means not advancing along it, but learning how to turn away from it entirely.



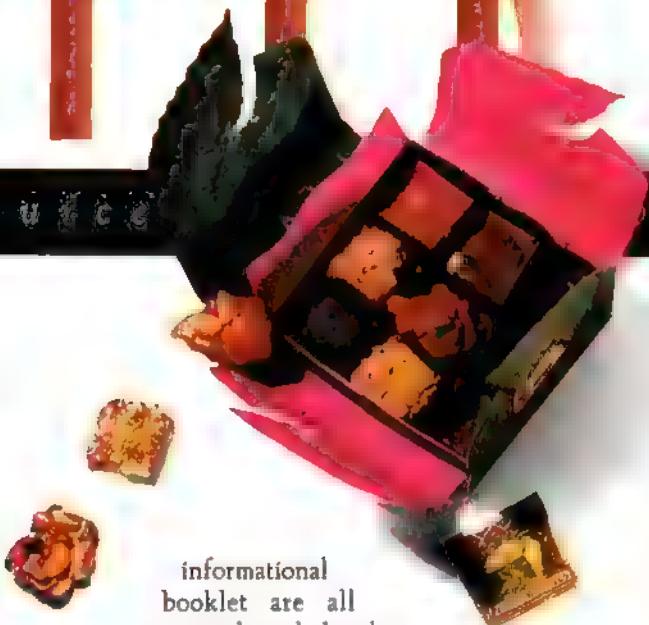
HAPPY MOTHER'S DAY

Products Resources

Earth-Conscious Chocolates

IF YOUR MOM HAS BEHAVED this year, reward her on Mother's Day (May 10) with a box of what might be the most environmentally sound chocolates you'll ever encounter. If that conjures up a vision of garbanzo beans dusted with carob powder, relax. Toucan Chocolates are nutty, chewy, creamy confections made with rainforest nuts. And aside from tasting terrific, from box to ribbon, this candy is a lesson in correct delivery.

The box and wrapper are made from 100 percent recycled paper (15 percent post-consumer), and if Mom's careful removing the seals, she can wrap your birthday socks in the empty package. The box, seals, and



informational booklet are all printed with bright vegetable-based inks, and the seals get their stick from solvent-free glue. Inside, the large treasures nestle tightly together to save space. The mix includes numerous nutty configurations, as well as caramels and buttercrunch. The six-ounce box (10 candies) retails for about \$9.95; 12 oz., \$15.95 to \$17.95.

If neither "green stores" nor gourmet stores near you carry them, you can mail order from Toucan Chocolates, P.O. Box 72, Waban, MA 02168; (617) 964-8696.

Five Star Plant Food

YOU KNOW YOU'VE ENCOUNTERED a marketing wizard when you find yourself cooing over rhino crap. Pierce Ledbetter, a Memphis native, has turned the Memphis Zoo's nose-twisting waste problem into an adorably packaged plant food.

This Zoo Doo guru collects the leavings of vegetarian zoo residents. He composts it, adding steamed-bone and steamed-leather meal and mined potassium sulfate to produce a nutrient balance of four percent nitrogen, three percent phosphorus, and four percent potash. When it's the consistency of dry, ground coffee, he packs it in plastic tubs (HDPE, #2).

A pound of Zoo Doo will do 50 square feet of the garden. Grandma gets more roses, the Memphis landfill gets less mess, and the Memphis Zoo gets 51 percent of the money! Zoo Doo Compost Company, 5851 Ridge Bend Road, Memphis, TN 38120; (800) I Luv Doo.

1 lb. tub, \$3.75; 5 lb., \$7.50; 15 lb., \$14.00. Add \$3 shipping per order, and ask about the other Zoo Doo products.





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FIRMA PUBLISHING, P.O.
BOX 91315, SANTA BARBARA, CA
93190-91315; (805) 962-0962. \$11.45 PPD.

THIS LITTLE BOOK deserves a place of honor next to the toilet plunger. With a minimum of hand-wringing and a maximum of humor, it'll guide you through water-saving alterations to your cellar, shower, kitchen, lawn, even your mindset.

Each of five sections — bathroom, kitchen, laundry, yard/garden/pool, and auto/garage — starts off with an overview. For instance, the yard and garden swizzle 48 percent of household water, on average. That's not surprising when you learn that a 5/8-inch hose can spurt away 1,000 gallons an hour.

Then comes the fun stuff — a pile of common-sense ideas and technological fixes. Under the heading of "Sinks and Faucets" you'll not only consider creating a "daily wash tub" in the sink (a pan of soapy water for those 17 single items that need a rinse in the course of a day), but you'll learn how to choose a flow-restrictor, and discover futuristic faucets — one whose flow you can preset, another that gushes automatically when your hands pass under its infrared eye. (Warn the cat who hops in the sink to diddle with the drain.)

Even the touchy issues are handled with aplomb. When suggesting you could be less compulsive about flushing the toilet, the authors elaborate thus: "Your kids will love this concept because they never remember to flush the toilet anyway and they will adore repreating the annoying little rhyme, 'If it's yellow, let it mellow. If it's brown....'"

With its feet on the ground and its head deep in the workings of the dishwasher, this book will give your family a realistic, informed basis for wasting less water.

Kids Books! At last!

My Earth Book

BY LINDA SCHWARTZ,
ILLUSTRATED BY BEVERLY
ARMSTRONG. 63 PAGES.
SOFTCOVER, \$10.95 PPD.

Earth Book for Kids

BY LINDA SCHWARTZ,
ILLUSTRATED BY
BEVERLY ARMSTRONG.
184 PAGES. SOFTCOVER,
\$12.95 PPD.

Animal Ecograms

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THE LEARNING WORKS,
P.O. BOX 6187, SANTA BARBARA, CA
93160; (805) 964-4220.

FOR SOME REASON, most of the environmental books written for kids in the past couple years have been, to quote a kid I know, dumb. They tend either toward a fruity ebullience or a bleak warning cry. Both genres show a puzzling propensity for repeating bad information.

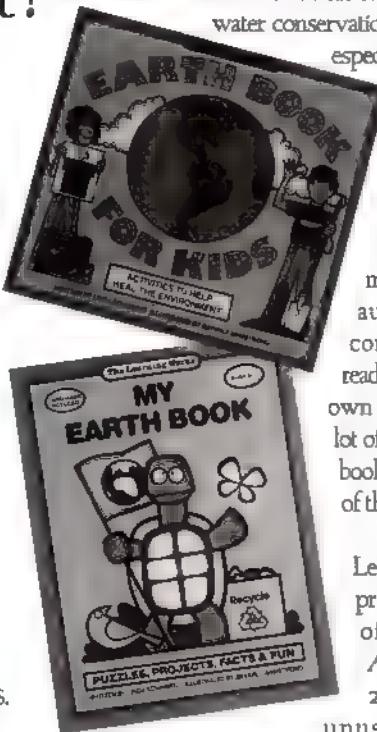
The Learning Works books, however, make me wish I were seven again. They're colorful, practical, positive, and educational.

Both books — *My Earth Book* (for ages 6 to 9) and *Earth Book for Kids: Activities to Help Heal the Environment* (ages 8 to 12) — are activity based. Kids learn about reusing resources by making puppets, stilts, and even clothing out of "garbage." They learn about recycling by filling in a chart as they locate products at

the store. Making a mobile, they learn about an endangered owl. Hosting a family contest for the shortest shower, they learn about water conservation. *Earth Book for Kids* is especially packed with things to do, experiments to try, and projects to tinker with.

All Beverly Armstrong's fun and friendly illustrations are meant to be colored, and author Linda Schwartz consistently pushes her readers to come up with their own creative expressions. A lot of thought went into these books, and kids will get a lot of thoughts out of them.

As a footnote, Learning Works has also produced a coloring book of postcards called *Animal Ecograms*. The 20 line-drawings of unusual creatures are gorgeous, and while author Beverly Armstrong doesn't direct kids to browbeat Exxon with the cards, she does suggest that communicating your love for creatures can have a positive effect. Hear, hear.



An Earth First! Literary Chat

SHALL WE FOUND A couple beers, smoke a cigar, and catch up on the Earth First! gossip? Did you know co-founder Dave Foreman (who has left the radical environmental "disorganization") is out on parole? The Court was less than impressed with the FBI infiltrator who couldn't talk Mr. Foreman into knocking down some power lines. A handful of other EF! folks drew jail time for taking the bait. ▶

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EEEEE

But the really hot EF! gossip is perfuming the air at literary parties. Like the contestants in a squabbly, public divorce, the various factions of Earth First! are telling their tale to anyone who'll listen, spelling out which friends they got in the settlement, what their plans are, and hinting what they think of their ex.

Wild Earth

P.O. BOX 492, CANTON, NY
13617. QUARTERLY,
\$20/YEAR

THE MOST EXCITING result is Wild Earth magazine. The mag maintains that EF! zeal, but channels it into hard-thought, hard-researched articles. A sampling from the second issue: 25 pages on "the new conservation movement," including analysis by Mr. Foreman, and the biographies of numerous organizations; an article on how exotic plants affect native ecosystems; a proposal for protecting California forests; and a poetic update from "Dr. Dioxin." Wild Earth is non-profit, nearly ad-less, sprinkled lightly with excellent poetry and line drawings, and is printed on recycled paper.



Earth First! The Radical Environmental Journal

EARTH FIRST!, P.O. BOX 5176, MISSOULA, MT 59806. EIGHT ISSUES, \$20/YEAR.

ANOTHER EF! FACTION (or rather, a fury of factions) is heard through Earth First! The Radical Environmental Journal. The newspaper sprouted after Earth First! Journal was decapitated by its bickering parents in December 1990. Earth First! is sophomorically humorous, haphazardly informative, and it prints numerous letters from readers who wonder, "What happened to Earth First!, who the hell are you, and why aren't we reading about science and biodiversity anymore?" The editors are, in fact, EF! activists who take turns at the typewriter.

The Earth First! Reader:

Ten Years of Radical Environmentalism

EDITED BY JOHN DAVIS. 272 PAGES.
GIBBS SMITH, PUBLISHER, P.O. BOX 667,
LAYTON, UT 84041; (800) 421-
8714. SOFTCOVER \$16.95 PPD.

LAST, BUT CERTAINLY not least on the gossip roster, is a book. *The Earth First! Reader: Ten Years of Radical Environmentalism* is a collection of stories snatched from obscurity in the yellowing pages of *Earth First! Journal*. Among the writers is Capt. Paul Watson, fearless leader of the Sea Shepherd organization, and full-time critic of "wimpy" Greenpeace. (Capt. Watson co-founded, then was ejected from Greenpeace. His adventure writing — this fellow rams driftnetting boats for a living — makes *Outside* magazine read like a pack of Scouts relating a trip to the library.)

Also present are Doug Peacock, patron saint of grizzly bears; green poet Gary Snyder; deep ecologists George Sessions, Arne Naess, and Stephanie Mills; and two dozen other characters. Bust open a Bud, snuggle up to the ashtray, and read up on the lifestyles of the broke and infamous.

Hidden Dangers: Environmental Consequences of Preparing for War

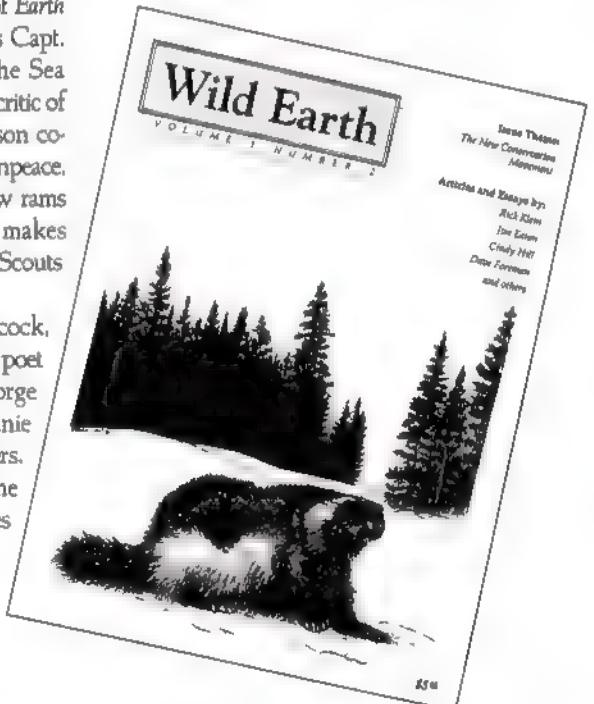
EDITED BY ANNE H. EHRLICH AND JOHN W. BIRKS. 246 PAGES. SIERRA CLUB BOOKS, 730 POLK ST., SAN FRANCISCO, CA 94109.
SOFTCOVER \$22 PPD.

WHILE WE'RE ALL GETTING intimate with the composition of our household garbage, there remain giant and mysterious sources of waste we're scarcely aware of. This book pokes its nose into the production of nuclear and chemical weaponry — a subject that until recently wasn't open for public discussion.

The attention *Hidden Dangers* pays

to numbers, regulations, and hard science is nearly nerdy, but it prevents the book from becoming hysterical over an astoundingly large problem. As a result, you'll marvel at the conditions that permitted nuclear pollution, and you'll ponder the problem of cleaning it up, but you won't find yourself squirming in front of the mirror, looking for mutating cells.

The 12 fact-packed essays are split into two sections. The first, "The Nuclear Legacy," amounts to a fascinating inventory of our nuclear-weapons-production facilities and transportation systems. As you become familiar with each facility, its place in the production



line, its trail of miscalculations, and its innocent goofs that'll last thousands of years, your amorphous fear recedes, revealing the root of the problem: We human beings get so enthusiastic when we produce a new technology that we fling ourselves into it before the bugs are worked out. In this case, the bugs happen to have us by the DNA.

The second section, "Beyond the Atom," picks up the loose ends: chemical weapons, psychological effects of weaponry, and weapons economics.

—Reviews by Hannah Holmes

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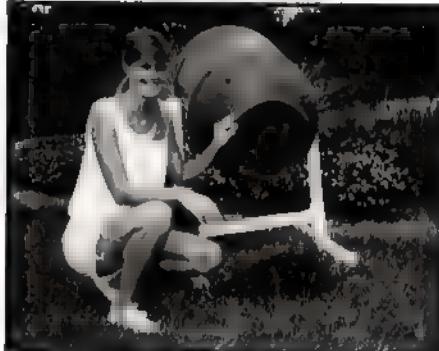
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Swimming Pool Qs

Q Assuming one wants to use his swimming pool for swimming, what is the most "natural" way to keep the pool clean?

JOE FLYNN
Florissant, Mo.

A JUST WHAT OTHER ACTIVITY DID you have in mind for your pool, Joe? A retirement pond for overgrown goldfish? Well, get this — in an Aquatic Systems pool, you can have your fish and swim with them, too.

Rather than zap water sterile with chlorine, Aquatic Systems puts a bed of gravel at the bottom of the pool. Attached to a hefty pump which can circulate 250 gallons of water a minute, the gravel is a home for vigorous aerobic bacteria. These microcritters help maintain a balanced pH, digest waste and other organic matter, and gobble offending microorganisms.

Small fish graze on the small amount of algae that grows in the pool and scarf up any bug eggs that venture in. Crucial to the system is some type of continuous aeration, such as a waterfall or spray fountain, which infuses the water with oxygen. Aquatic plants enhance the effect and give the fish a place to hang out.

Inventor Pat Boehm maintains that health and sanitation officials haven't objected to Aquatic Systems, which costs about \$5,000 for a 30-by-15 foot pool. (You'll have to supply the fish.) To get more information, contact Aquatic Systems at 15945 Southwest 90th Ave., Miami, FL 33157; (305) 252-4118.

Should this be a little too natural (and expensive), there are other options. To maintain a balanced pH, adding bicarbonate of soda or soda ash raises the pH level to where it should be — about seven. The only other "natural" alternatives to muriatic

or hydrochloric acid for lowering pH are household acids such as vinegar, which stinks as well as costs a bunch because of the vast amounts needed.

As for purifying water, most pools use chlorine, a fact blonds hate because it can turn their hair green. Fortunately for towheaded swimmers and the rest of us, there's a better answer: ozone. Yes, this highly unstable molecule of three oxygen atoms has the same bacteria-killing and odor-neutralizing qualities as chlorine. And yes, if inhaled long enough or in high enough concentrations, surface ozone can cause chronic pulmonary distress. But

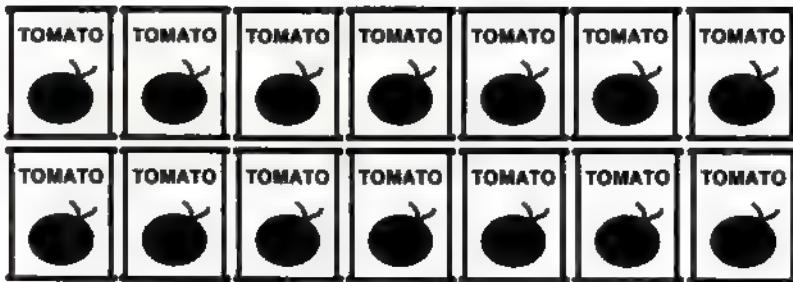
even if every home in Los Angeles had an ozone-purified swimming pool, the amount of vented gas would be but a fart compared to the volumes created by vehicles and industry.

In an ozonization system (which will set you back from \$800 to \$3,000), swimming-pool water is channeled past an ultraviolet light which converts plain oxygen molecules to ozone — the sun's ultraviolet radiation does the same thing to water vapor in the upper atmosphere. Some chlorine must still be added to keep bacteria down when the pool is empty and the water isn't stirred up, but the dosage is typically halved. Ozone can completely eliminate chlorine if the pool has a light swimmer load (as in a couple of adults who shower before they dive).

Ozonization systems are not yet widely available, so inquire at larger swimming-pool centers or contact the manufacturer, Del Industries, Inc., to find



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your nearest retail dealer, Box 4509, 3428 Bullock Lane, San Luis Obispo, CA 93408; (800) 676-1335. Try also looking under water purification in your business telephone directory. Ozonation is already popular in France and Germany, and among water-loving blonds.

Q What can we do with old, used cooking oil? Is there any chance of using it in the car?

BARRA Mc NEILL
New Denver, British Columbia

A THE CHANCES ARE BETTER THAN you might think. As reported in the *Irish Echo*, Charlie McDonald, a senator from Abbeyleix, Ireland, is one of a growing number of transportation visionaries using vegetable oil as vehicle fuel. He rigged his conventional internal-combustion engine so that vaporized oil sets off spark plugs that pump pistons. His car gets 18 to 25 miles on a litre of grease, (about 75 miles to the gallon). Like cars using biomass fuels such as ethanol, the combustion end product coming from the tail pipe is mostly water vapor with a bit of particulate matter. It smells like french fries.

Alas, since there are no factories that mass-produce greasemobiles, they are rare and expensive. So here's some real-world advice. First, don't toss cooking oil on the compost heap: It can suffocate microorganisms. While I don't know of any town that prohibits residents from washing small amounts of kitchen fats down the drain, dumping gallons of grease down the sewer or on the ground can result in stiff water-pollution fines.

Food establishments usually capture oily wastes in sewage-line traps. Those producing gallons of oily wastes a day, like fast-food joints with deep-fat fryers, set it aside in special recycling bins. Some might take your oil, so inquire at your local fry palace. Cast-off oil can be rendered and transformed into stearic acid, stearate, and other names off the cosmetics hit parade of not-so-secret ingredients. You read that

right, gals (and a few of you guys). The base material for your lipstick is probably old fryer fat.

Q I recently replaced an asphalt-shingled roof on a two-stall garage. As I hauled the old shingles away to the landfill, I wondered if anyone ever recycled the stuff. Route 18 is being repaved and I thought that would be a good use.

TIMOTHY B. MEDARAC
Beaver Falls, Penn.

A YOUR CONCERN FOR ASPHALT IN landfills is warranted. Estimates from waste-management groups say construction and demolition debris takes up 20 percent of the municipal solid-waste stream; about one-fifth of that is roofing scraps. But take heart: Pennsylvania's Route 18 may already contain the remains of roofing discards.

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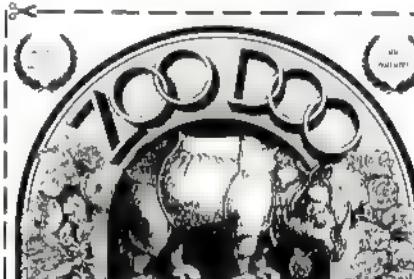
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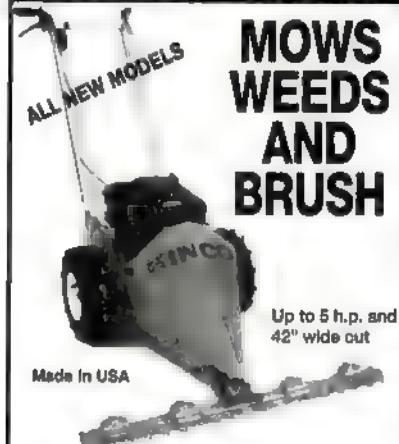


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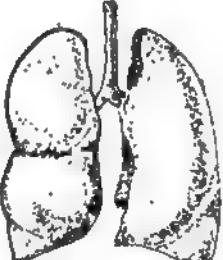
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Laying Low in the Grassroots

HERE'S A NEW ENVIRONMENTAL GROUP: People for the West!, which bills itself as a grassroots campaign promoting "wise use" of the land. You may have seen its supporters waving homemade signs at rallies and hearings. One of its organizers may have knocked on your door.

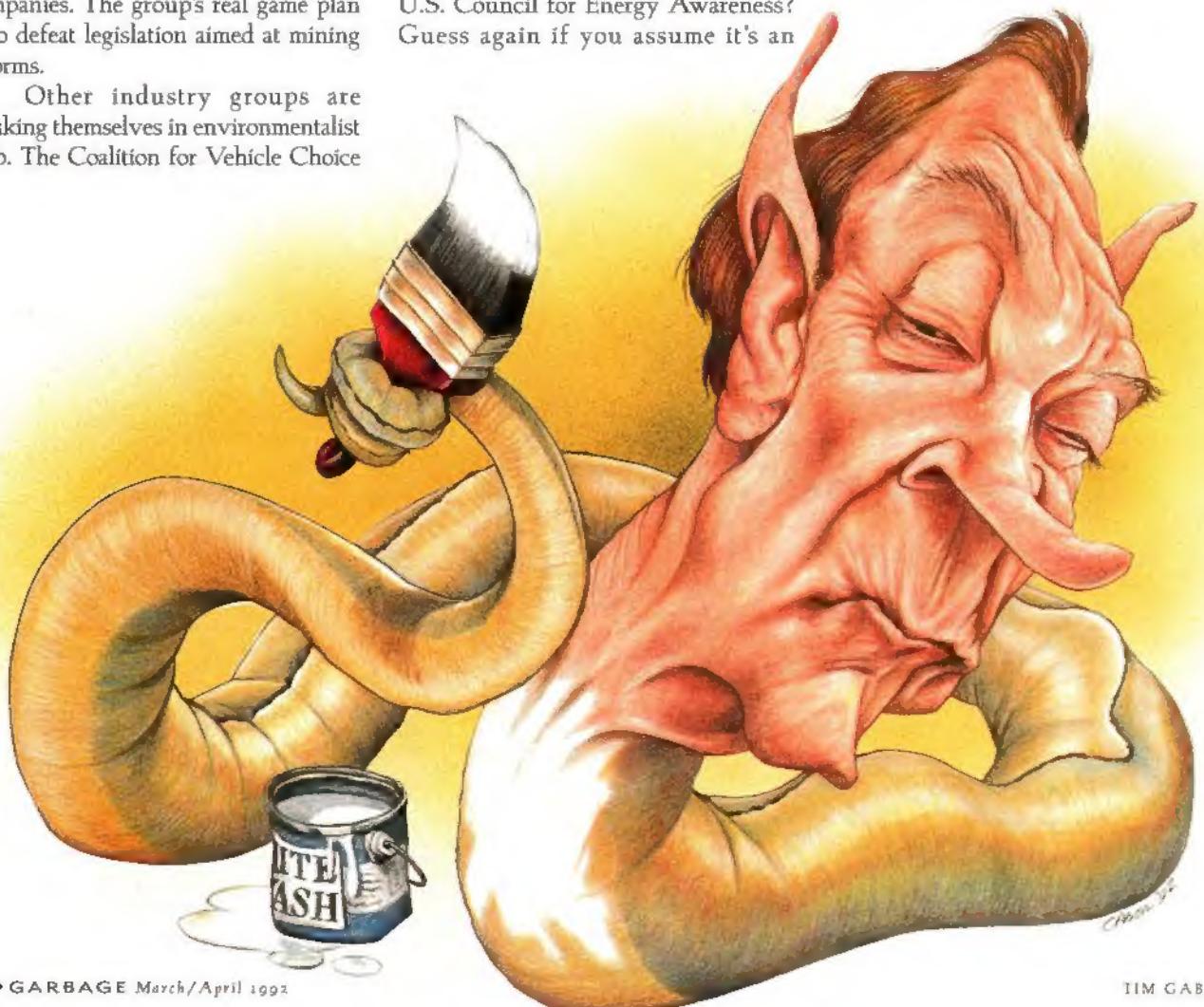
Before you write out a membership check, let me tell you a little something about them that isn't readily apparent in their homegrown appeal. According to *High Country News*, 96 percent of the funding for People for the West! comes from corporate donors, most of them mining companies. The group's real game plan is to defeat legislation aimed at mining reforms.

Other industry groups are cloaking themselves in environmentalist garb. The Coalition for Vehicle Choice

sounds like a Nader-style consumer-rights group. But most of CVC's members are linked to the auto industry, and the "coalition" is currently fighting legislation that would boost fuel efficiency in cars. Or how about the U.S. Council for Energy Awareness? Guess again if you assume it's an

educational group promoting wind or solar energy. The correct answer? It's the nuclear-power industry's public-relations arm.

Of course, these groups have every right to any name they choose. Our precious right of free speech guarantees that industry and environmental groups alike can put forth their views — and even unabashedly advance their agendas. But when an organization seeks to disguise its true identity, you have to wonder what it's really up to. ☐



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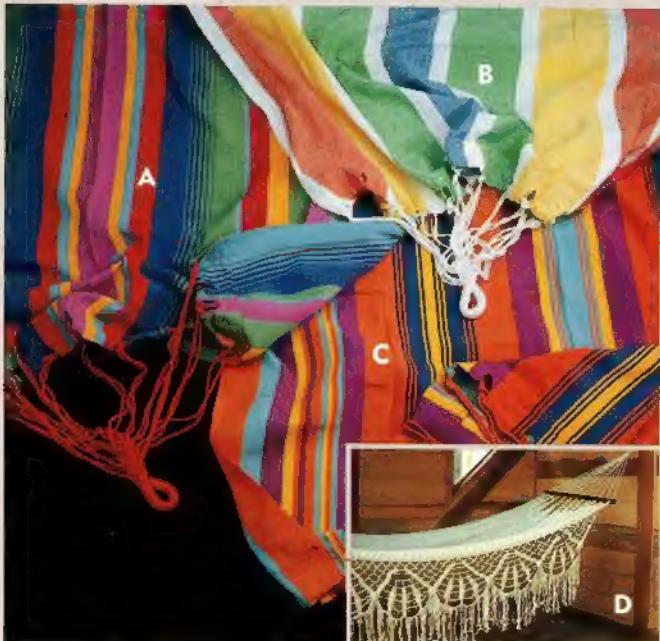
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Fu·gi·tive O·dor noun — The heady bouquet of ammonia when it takes flight from a sewage treatment plant, stimulating the olfactory organs of residents even miles downwind.

The term can be traced to a sewage supervisor in Pennsylvania, through an article by Wastewater Operations Manager William Horst in *BioCycle* magazine. Locals near Lancaster's (Penn.) South Sewage Treatment Plant called the odor rank and raw — and they let plant operators know about it. Feeling the heat, the supervisor fumed, "We've got to do something about these fugitive odors!"

"It seems to be catching on," says Mr. Horst, the first to use the term in print. "Even the EPA is starting to use it."

Back at the sewage plant, a posse of odor detectives tracked down the problem: Industrial-strength fumes were bypassing a three-stage scrubbing system and slipping through exhaust fans into the atmosphere. So enclosures were built and fumes are now funneled into a scrubber that sprays sodium hypochlorite to bleach out smelly organics. The plant has also posted sentries who sniff for villainous vapors in "common complaint areas" (read neighborhoods). Mr. Horst reports that months go by without a breakout.

